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Edited by James J. Finn

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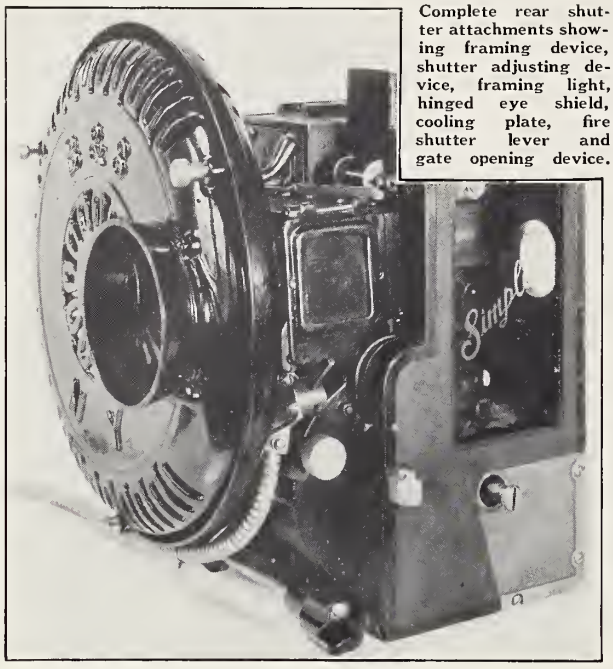

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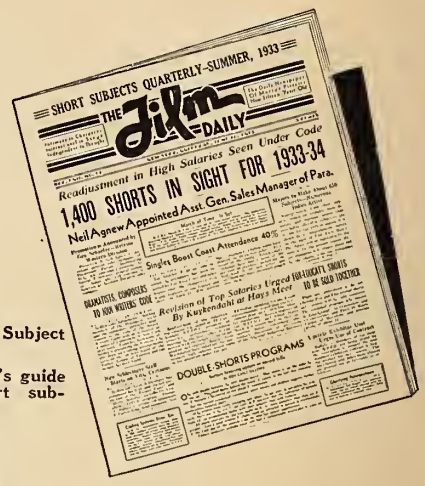

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Edited by James J. Finn

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MONTHLY CHAT

DECIDEDLY a hit is the series of articles on mathematics for the projectionist, authored by Gordon S. Mitchell, now current in these pages. For years now we have speculated on ways and means to goad our readers into letter-writing, but no question-and-answer series of articles rang the bell until the Mitchell articles hove on the scene. There must be other topics which would prove equally interesting to a majority of readers, and we certainly would like to receive a few suggestions along this line.

OUR wearied postman is further burdened by hundreds of letters of thanks from organizations and individuals relative to our distribution of code information immediately following the close of the Washington hearings. Proud to serve such an appreciative audience, I.P. is content to say "You're welcome".

RCA-VICTOR CO. is reported as about ready to form a $30,000,000 subsidiary to promote its television interests. Said information wins little credence from us, but it does serve as a reminder to have another look into the present state of the television art. The new N.B.C. studios in Radio City are thrice prepared down to the last circuit for television broadcasting—when, as and if a number of technical problems and one big merchandising problem are settled. The answer to the question, "Who's going to pay the tariff?" will determine the possibilities for television within the near future.

WE don't relish some of the practices now current in the theatre equipment field, particularly with respect to compulsory servicing, the blanket repair and replacement part contract, so-called, which is sponsored by Erpi, and the release of false information regarding operating values of certain types of sound tubes in order to harass the independent tube manufacturer. It occurs to us to ask why, if RCA can sell its sound reproducing equipment outright and not impose compulsory servicing burdens on exhibitors, Erpi should not do likewise.

Maybe the impending suit of 102 New York exhibitors against Erpi will provide the answer to some of these questions.

PROJECTIONISTS' *modus operandi* makes them easy marks for colds which often develop into something more serious. Read the Cold Code within, and watch yourself.

Every year at this time we make an appeal for support of the Xmas Seal drive. A pleasant duty on our part, for we have personal knowledge of the aid rendered to projectionists by the organization backing the Seal drive. Buy Xmas Seals.

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INTERNATIONAL PROJECTIONIST

VOLUME VI NUMBER 2

NOVEMBER 1933

MATHEMATICS FOR THE PROJECTIONIST

Gordon S. Mitchell and *Harlan R. Asquith*

III. Algebra

IN this lesson we will consider the subject of algebra. Although algebra may seem to be of little use in projection practice, there are many common problems which cannot be solved by arithmetical means but must be attacked through the methods of algebra.

In arithmetic we deal entirely with numbers, including whole numbers, fractions and decimal numbers. In algebra, numbers are often represented by letters of the alphabet, and the various operations are performed on these letters rather than upon the numbers for which they stand.

For example, if a certain coil of wire has a resistance of 6 ohms, instead of using the 6, we might say that it has a resistance of "b" ohms. That is, we let b=6, and then use the "b" in making our calculations.

One of the most important things to remember is the fact that the same operations which you have performed with numbers can also be performed with letters. These operations include addition, subtraction, multiplication, division, raising to powers, and extracting roots.

In the example above, if we have three coils in series—one with a resistance of "a" ohms, one with a resistance of "b" ohms, and the third with a resistance of "c" ohms—we would find the total resistance, which we might indicate as "R" ohms, by adding the three numbers and indicating the sum thus:

$$R=a+b+c$$

In actual practice, however, we cannot add "a" and "b" together any more than we can add one screen and one projector to get any more simple expression than one screen and one projector. However, we can add "a" and "a" to get the sum "2a",—just as we may add one screen to one screen, to get the expression "2 screens".

To find the difference between the resistance of a and b we indicate the subtraction thus: a—b.

Multiplication in algebra is indicated in any one of several ways: "a x b", "a · b", or simply by "ab". If instead of the coils discussed above, we have three coils in series, each with a resistance of "b" ohms, the total resistance would be three times b, or 3b.

In the expression 3b the number 3 is called the *coefficient* of b, because it means that b is taken three times. Similarly, if we have "n" coils in series the total resistance is "n times b", or "nb". In this case "n" is the coefficient of "b". A coefficient may be one or more letters (nrb); a whole number (35b); a common fraction (½b); or a decimal fraction (2.37b).

If no coefficient is expressed—that is, the term "b" (or any other term), appears alone—a coefficient of one is un-

This is the third of a series of articles on mathematics written especially for the projectionist. Appended is a group of questions bearing on the information given immediately preceding, a procedure which will be a regular feature of this series. Also appended hereto are the answers to the questions in Article II, together with the names of those who submitted correct answers thereto.—Editor.

derstood. This is in line with common practice in everyday life—we speak of "a carbon" or "the shutter", and although we don't actually specify one article, our meaning is taken as only one unless a greater number is actually expressed.

To divide a by b we write:

$$a \div b, \text{ or } \frac{a}{b} \text{ (a over b)}.$$

In dealing with powers, either the number to be raised to the power or the exponent (see lesson 1) or both, may be letters. For example: "a^2" is read "a squared"; while "$6 \cdot 7^N$" is read "6 point 7 to the nth power"; and "bc^2n" is read "b times c to the 2 nth power". In this example, c only is raised to the 2 nth power and b is the coefficient of c.

The same applies to the extraction of roots. $\sqrt{a}$ is read "the square root of a"; while $2\sqrt{3b}$ is read "2 times the square root of 3b"; and $\sqrt[n]{a}$ is read "the nth root of a".

When several of the above operations are indicated in a single algebraic expression, the proper order of operations must be followed if the right answer is to be obtained. This order is: first, powers and roots; second, multiplication and division; and third, addition and subtraction.

An example will best illustrate the point that if this order is not followed, an entirely different (and incorrect) answer will be obtained, thus:

$$3+4 \cdot 7+3-\frac{6}{2}+4 \cdot 2^3-\sqrt{25}= \ ?$$

Following the rule for order of operations laid down above, we obtain powers and roots first,—cubing the 2 to obtain 8, and extracting the square root of 25 to obtain 5. The expression then becomes

$$3+4 \cdot 7+3-\frac{6}{2}+4 \cdot 8-5= \ ?$$

Performing the second series of operations, multiplication and division, the expression becomes

$$3+28+3-3+32-5= \ ?$$

which finally resolves itself to, by performing the indicated addition and subtraction, an answer of 58.

Parentheses are often used in algebraic expressions to indicate that the operations *are not* to be done in the usual order. In such cases all the operations within the parentheses are performed first, and then the rule is followed as before.

Examples: $(2+3) \cdot (5-1)=5 \cdot 4=20$

$(3+27-5)-(1+7-2)=25-6=19$

$(2\ 3)^2=6^2=36$

$\sqrt{(1+10-2)}=\sqrt{9}=3$

In arithmetic, all numbers are considered as *positive*, or greater than zero, and in arithmetic, it would be impossible to indicate such a subtraction as 4—6. In algebra, however, it is oftentimes necessary to use numbers that are less than zero—such numbers being known as *negative numbers* and are indicated by a "minus" sign placed before them, thus: "—7". The result of performing the subtraction indicated above would thus be: "6 from 4 is 2 less than nothing", or "—2 (minus two or negative two)".

Positive and Negative Numbers

Positive and negative numbers find a common usage on a thermometer, which measures temperature *above* and *below* zero, while another usage, more or less common in electricity and engineering, is in the consideration of the direction of flow of direct current. If a 5-ampere current be flowing in one direction and its flow can be reversed, the current of the reversed flow will be —5 amperes *in comparison with* the first current.

In adding positive and negative numbers, all the positive numbers are first added together; secondly, all the negative numbers are added together, and then the smaller sum is subtracted from the larger. The sign of the result is given by the sign of the larger of the two sums obtained as above. For example:

$$5-12+7+2-8$$

adding the positive numbers (5+7+2) we get 14, while adding the negative together (12 and 8) we get —20. The answer will be the difference between 20 and 14, *but its sign will be minus* inasmuch as the sign of the larger number (20) is minus, or —6, the resultant difference.

(The first number of any algebraic expression, *where no sign is indicated*, as the 5 in the above example, is always considered as being positive. If the number is to be treated as negative, a minus sign will be appended.)

In subtracting one algebraic expression from another, the procedure is similar to the above, except that the sign of all terms in the subtrahend (the expression being subtracted), must be changed, after which the terms are added exactly as shown above. For example, let us take the term (3+4—5+6) and subtract it from the term (—5+7+9—1). Algebraically, this would appear:

$$(-5+7+9-1)-(3+4-5+6)=x$$

In algebra, it is commonly accepted practice to let any unknown (in this case, the answer for which we are solving the subtraction equation), be represented by "x". When you reach the more complicated algebraic equations which contain more than one unknown, you will learn that another common algebraic custom is to represent *unknown quantities* by letters towards the end of the alphabet, such as x, y, and z, while *known quantities* are represented by letters towards the beginning of the alphabet, such as a, b, c, d, etc.

Returning to our example, and following out the rule—that is, changing the sign of each term of the subtrahend and then carrying through the addition operation—our equation becomes

$$(-5+7+9-1)+(-3-4+5-6)=x$$

After the signs have been changed, the parentheses no longer signify anything, and hence may be discarded. The equation now reads

$$-5+7+9-1-3-4+5-6=x$$

which when solved gives the answer 2 as the value of x.

When, in an algebraic expression, two terms of the same sign (it doesn't matter whether these signs be positive or negative, just so they are the same for each of the terms), are multiplied together, the sign of the result will be positive. If, however, the two terms have different signs (one positive and the other negative), the sign of the result will be negative.

This same rule applies for division. If a term be divided by a term of like sign, the quotient will be positive; while if the divisor be of different sign than the dividend, the quotient will be negative.

A specialization of the rule for multiplication of terms of like or unlike signs is that the even powers of any number or letter—second, fourth, sixth or eighth, etc.—will be positive, *whether the number or letter be either positive or negative*. Similarly, the odd powers—third, fifth, seventh, ninth, etc.—will be negative *regardless of the sign of the original term*.

One of the most important subjects in algebra is that of equations. An equation is a statement of equality between two terms of an algebraic expression. An

A. P. S. Suggests Changes in Standard Print

TWO important changes in the present makeup of the Standard Release Print are suggested in a resolution adopted at a recent meeting of the American Projection Society, New York Chapter. The resolution urges that at least 18 inches of action photography follow the change-over cue mark, so that there will be less chance of blank leader being projected. Also recommended is the photographing of the part number of the subject on the footage numbers of leaders on S.R.P's. The latter would provide an additional check on correct reels, particularly in double-feature theatres.

President W. Byrne of the New York Chapter named a committee consisting of M. D. O'Brien, George Edwards and P. A. McGuire to enlist support for the resolution within the S. M. P. E., the P. A. C. and the Academy.

equation may be stated in the form of numbers, letters or any other mathematical symbols. That part of the equation to the left of the equals sign is called the left-hand side of the equation; that part to the right, the right-hand side of the equation.

The following examples will enable you to recognize and know just what an equation is:

$$5-3=2$$
$$a\cdot x+b\cdot y=7$$
$$10\ (x+3)=4$$

In dealing with algebraic equations, there are six simple and fundamental rules which are self-apparent, once the definition of an equation and an understanding of that definition have become thoroughly familiar.

To repeat: an equation is a statement of equality between two mathematical terms—that is, two terms, each one equal to the other and set up in such a form to *show that equality*—basically form an equation. In considering the six fundamental rules, let us take for our basic equation the example given above: 5—3=2. This is a true arithmetical statement, and fulfills our definition of an equation.

(*a*). The same number may be added to each side of an equation without destroying the equality:

$$5-3=2 \text{ (Applying rule a)}$$
$$5-3+7=2+7$$
$$\text{or solving, } 9=9$$

(*b*). The same number may be subtracted from each side of an equation without destroying the equality:

$$5-3=2 \text{ (Applying rule b)}$$
$$5-3-1=2-1$$
$$\text{or solving, } 1=1$$

(*c*). Both sides of an equation may be multiplied by the same number without destroying the equality:

$$5-3=2$$
$$9(5-3)=9\ 2 \text{ (Applying rule c)}$$
$$\text{or solving, } 18=18$$

(*d*). Both sides of an equation may be divided by the same number without destroying the equality:

$$5-3=2$$
$$\frac{5-3}{2}=\frac{2}{2} \text{ (Applying rule d)}$$
$$\text{or solving, } 1=1$$

(*e*). Both sides of an equation may be raised to the same power without destroying the equality:

$$5-3=2$$
$$(5-3)^2=2^2 \text{ (Applying rule e)}$$
$$\text{or solving, } 4=4$$

(*f*). The same root may be extracted of both sides of an equation without destroying the equality:

$$5-3=2$$
$$\sqrt{5-3}=\sqrt{2} \text{ (Applying rule f)}$$

Solving, by means of logarithms as explained in Lesson 2,

$$1.414=1.414$$

The important thing to remember in dealing with equations is that any operation performed on one side of the equation must also be performed on the other, in orded to maintain the equality. Should one side be operated upon without the same operation being performed on the other, the fundamental equality would be destroyed and the equation would no longer be a true equation. If we take our example equation, 5—3=2, and add, let us say, 6 to the right-hand side without adding 6 to the left, we

Answers to Problems, Article II

MATHEMATICS FOR THE PROJECTIONIST

REFLECTING the growing interest within the craft in this series of articles is the greatly increased number of answers received to Article II, dealing with logarithms, which was printed last month. Into the swim this month plunged a total of 168 potential mathematicians, a majority of whom evidently will have to apply themselves more diligently, for of this number only 47, including most of last month's standbys, turned in perfect papers.

But first let us consider the answers:

Problem 5.—*Explain in a few words the difference between the Naperian system and the Common system of logarithms.*

Ans.—The Naperian system of logarithms is based upon the letter "e", a number of approximately the value 2.718; while the Common, or natural, system is based upon the number 10.

Problem 6.—*What is the characteristic of the logarithm of the following numbers*:

5,579; 25; 611; 895,728; 323?

Ans.—3; 1; 2; 5; and 2.

Problem 7.—*Complete the following multiplications by logarithms, showing each step in the calculations*:

$$250\cdot731=$$
$$428^2=$$

Ans.—Log 250 equals 2.3979
Log 731 equals 2.8639

Adding.... 5.2618

Referring to the log tables, the number whose logarithm is 2618 is 1827. From a consideration of the characteristic, we know that the product contains six (6) numbers to the left of the decimal point, hence the answer is 182,750.

428^2.....

Log 428 equals 2.6314. Two (2) times 2.6314 equals 5.2628. The number whose log is 2628 is 1831. From a consideration of the characteristic we know that the answer must have six (6) places to the left of the decimal point, hence the answer is 183,100.

Problem 8.—*Divide 725 by 25 by logarithmic method, showing each step in the calculation.*

Ans.—Log 725 is 2.8603
Log 25 is 1.3979

Subtracting.... .4624

Referring to the log tables, the number whose logarithm is 4624 is 29, Answer.

Problem 9.—*Extract the cube root of 512 by logarithmic method, showing each step in the calculation.*

Ans.—Log 512 equals 2.7092. The root index is 3, which divided into 2.7092 equals .9031, the log of the cube root of 512, or 8, Answer.

Questions 6 and 7 evidently occasioned some difficulty, several papers listing the characteristic of the log of 5,579 as 4, whereas the correct answer is 3; and in question 7, several "students" let slip their minds the information given relative to "significant figures" and proceeded to worry unnecessarily about the last three digits in the answer.

Including those who slipped up only on the first exercise of Problem 6, the complete list of those who submitted correct answers follows: G. L. Cummings, Edward Burke, Dale Danielson, H. L. MacKenzie, Joe Barnett, Alex Schaeffer, Harry Ginsburg, Lou Adams, Donald Taylor, Otis Clarke, A. Henderson, Ivar Olson, D. E. Weiss, Lloyd Garrity, John Butler, Patrick Callahan, Leo Sinoski, Sam Tillson, Charles Bederman.

Also, Paul Gaeth, Jr.; Elmore R. Towne, Carl Broening, Ellsworth Bauer, Jack Murray, Clyde Woods, Eddie Howson, James Edwards, Thos. L. McGuire, Herbert L. Armstrong, W. Hoy, L. N. Osgood, Frank Nerogin, James Murphy, M. Aquilino, Samuel Barr, Harry Gilman, Leonard Hudson, Clifford Newton, Saul Oberman, Willard Jarvis, Richard Egrey, John P. Fegan, O. Hollenbeck, Milton Krebs, F. Kassler, Elmer Jameson, and Mason Sperling.

Special mention for fine papers is due to Paul Gaeth, Jr., Elmore R. Towne, Herbert L. Armstrong, Eddie Howson, W. Hoy, and Dale Danielson. Just before press time there arrived a perfect set of answers to the problems in Article I from Max Cann, employed as a projectionist at the Opera House, Hawera, New Zealand. Comments Mr. Cann, in part: "Congratulations to you for the way every detail of this series is explained. Being only a beginner in projection I have had much benefit from your monthly issues, and I am taking the greatest interest in the series on mathematics. We should have more material of this sort."

Elmore R. Towne, L. U. 225, Aberdeen, S. D., relates how the articles "chased" him into the library in search of additional information, as follows: "Your lesson on logarithms was so inspiring that I spent several hours digging into text books for additional information on the subject, which proves that the course has benefitted me already. Keep it up!"

The author of this series of articles Mr. Gordon S. Mitchell, cites the probobility of many readers having questions to ask with respect to the various points developed in the lessons, as well as other questions which come to mind relative to different applications of the problems listed. Mr. Mitchell urges prompt submission of all such questions, the answers to which will appear in a special article to appear in the near future.

will have 5—3=2+6, which when solved gives us 2=8 which is obviously not true.

Equations are of use to us in solving for unknown quantities, and are most often set up from statements similar to the following: Mr. A has $5.30; Mr. B has $16.20; but Mr. C's holdings are not known. However, we do know that between them, the three men have a total of $53.00.

To determine the amount of money held by Mr. C, we will set up an equation in which the letter "x" will designate this amount, and then solve for x. In this equation, we will express Mr. A's $5.30 by the letter "a", Mr. B's $16.20 by the letter "b", and the total $53.00 by the letter "d".

From the statement of the problem given above, we know that

$$a+b+x=d$$

In order to put this equation in such a form that it may be easily solved, we will first (by rule b) subtract "a" from each side:

$$a-a+b+x=d-a$$

solving, $b+x=d-a$

Similarly, we subtract b from each side of the equation, to put it in the form,

$$x=d-a-b$$

Now that we have the equation in the proper form for solution—that is, with the unknown on one side and all the known quantities on the other—we substitute the numerical values for their corresponding letters, and solve for x, as follows:

$$x=53.00-5.30-16.20$$

or x, Mr. C's holdings=$31.50.

While in this case the algebraic solution of the problem may appear to be longer and more complicated than would a corresponding arithmetical solution, there are many examples which might be given wherein the use of algebra is absolutely necessary in order to arrive at a solution, and others wherein the algebraic solution will be very much shorter than would be the arithmetic. However, in order to prepare for the solution of these more complicated equations, it is necessary to become familiar with and adept at handling the simpler forms of equations.

There are many types and kinds of algebraic equations, but before taking up a study of the more complicated types we will first consider the "simple" or "linear" equation.

Linear Equations

An equation, to be linear, must fulfill certain requirements. It may contain one or more unknowns, but *must* contain only unknowns of the first power (that is, no unknown may be squared, or cubed or raised to a higher power), which presupposes that no unknown can appear as an exponent, it must *not* have more than one unknown in the same term (that is, no unknown may be multiplied or divided by another unknown); and lastly, that it must be in such a form that by treating it according to one or more of the six fundamental rules given above, all of the unknowns may be removed from the denominator of any fraction appearing in the equation.

In order that you may become familiar with the difference between a linear equation and those which are not of the linear type, the following examples are linear:

$3x+4y=27$. (Unknowns: x, y.)

$\frac{x}{y}=15$.

(Unknowns: x, y which can, by multiplying both sides of the equation by "y", be expressed as $x=15y$.)

$5x+3x-x-12=2x$. (Unknowns: x.)

The following are *not* linear equations:

$3x^2+y=27+x$. (an unknown has the exponent 2.)

$xy-x=1$. (x and y, both unknowns, occur in the same term.)

$a^x+3b=1$. (x, an unknown, occurs as an exponent.)

$2x+\frac{1}{x-3}=x+1$.

(the equation cannot be legitimately changed so as to get rid of the unknown in the denominator.)

Within the classification of those equations which are linear, there are two sub-groups:

(1) equations which have only one unknown and

(2) equations which have more than one unknown.

Considering first those equations which have only one unknown, let us solve a simple equation to determine the value of the unknown quantity. Let us take the equation:

$$5x=x+12$$

First (by Rule b) above, we may subtract x from each side of the equation, which will in effect change the equation so that all terms containing the unknown (x) will be on the same side of the equals sign:

$$5x-x=x-x+12$$

or simplified, $4x=12$

Then (by Rule d) above, dividing both sides of the equation by 4 in order to arrive at a value for x, we find that

$$\frac{4x}{4}=\frac{12}{4}, \text{ or } x=3$$

In order to check the correctness of this answer (it is always advisable to check an algebraic computation whenever possible), we substitute 3 in the original equation wherever x appears, as follows:

$$5x=x+12$$

$5\ 3=3+12$, which upon solving becomes

$$15=15$$

The value 3 is known as a "root" of the equation, and mathematically is said to "satisfy the equation". Should this value of 3, which we have obtained for x have been incorrect, this would have been apparent upon checking the solution.

Substituting an incorrect root in the original equation would result in an inequality. For instance, let us substitute the value x=4 in the equation and solve:

$5x=x+12$, substituting

$5\ 4=4+12$, which upon completing the indicated multiplication and addition becomes

$20=16$, which is obviously incorrect

Consequently, 4 is not a correct root of the equation, inasmuch as the equation is not satisfied when the value 4 is substituted for the unknown x.

'Transposing'

You will notice that in preparing the example above for solving, we subtracted x from each side of the equation. In effect, this operation is the same as if we had moved the x from the right-hand side of the "equals sign" to the left-hand side, changing its sign at the same time. Had this been done, the second step of our solution would have been

$$5x=x+12$$

$5x-x=12$, which when simplified becomes

$$4x=12$$

Moving any term of an algebraic equation from one side of the "equals sign" to another is known as "transposing" and oftentimes results in considerable simplification of the algebraic operations. Any term may be transposed from one side of the equals sign to the other, *provided its sign is changed.* It should be borne in mind, however, that transposing a term is in effect actually adding or subtracting *the same term* to *both sides* of the equation.

(To Be Continued)

Problems, Article III:

10. In the following, solve for the unknown, showing each step in order to indicate the proper order of separation.

(a) $x=\frac{10\ 7-7^2+1400+3^2-49+20}{20}$

(b) $y=20+7+(7+2)-(4-2)^2$

11. Subtract:

$(-10+1-2+5)$ from $(7+10-3+2)$

12. (a) Multiply: —5 by 7.

(b) Divide: —32 by —4.

13. Solve the following equation to obtain the value of "x":

$$4x+7=2x-3$$

GRAPHITE ANODE TUBES FOR SOUND REPRODUCERS

D. E. Replogle

CHIEF ENGINEER, ELECTRONICS DIVISION, HYGRADE SYLVANIA CORP.

RED hot plates or anodes in sound equipment tubes operating at full load hour after hour may soon become a bygone experience. At least, tubes are now being produced in which the heat dissipation is so greatly increased that the anodes or plates simply cannot attain glowing temperatures. Other advantages accrue to these cooler running tubes and likewise to sound systems in which they may be employed.

The unique graphite anode or plate, introduced some six months ago in certain air-cooled radio transmitting tubes, accounts for cooler operating tubes. Graphite or pure carbon presents that perfect heat radiator, the black body, which we learned about in our school physics. In fact, for years past tube engineers have tried to incorporate carbon in the makeup of tubes, particularly power tubes, but many practical obstacles have stood in the way.

Attempts at a solid carbon anode have generally been along the lines of an assembly of segments or sections, resulting in troublesome contact resistance between pieces. Again, the carbon anode when introduced in the glass bulb and subjected to induction heating or bombardment, liberates not only the impurities due to the binder of commercial carbon, but also the amorphous carbon or loose surface coating. Impurities and carbon dust released in the glass envelope settle on the inside walls, thereby actually decreasing the heat dissipation and defeating the very purpose for which the carbon anode is intended, and again settling on glass press, spacers and other non-conducting elements to cause troublesome leakage. Quite obviously, the commercial carbon mass must be treated *prior* to its insertion in the glass bulb, to remove all impurities and amorphous carbon and reducing it to the pure carbon or graphite form.

Production Process

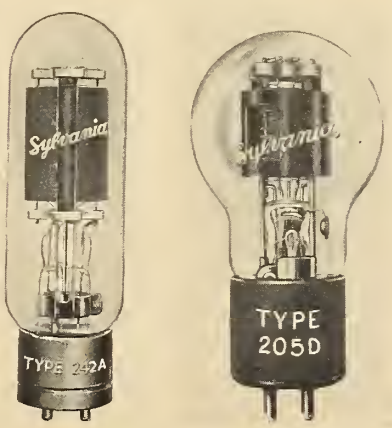
How to remove the undesirable elements has heretofore constituted the problem. Last March that problem was successfully solved not only in laboratory procedure but also for actual production by Victor O. Allen, assistant chief engineer and tube chemist for Hygrade Sylvania.

The unique graphite anode now employed in the entire line of Sylvania air-cooled transmitting tubes, from the small 210 oscillator to the giant 1-kilowatt oscillators and modulators, as well as extended to the power equipment field, begins with a solid block of commercial carbon precisely machined to final size and shape. Tolerances of one one-thousandth of an inch are adhered to in this machining. The one-piece anode includes ribs, rims, lugs and holes, so that it may be mounted in its metal support by means of bolts and nuts and rods, in a thoroughly mechanic-like manner.

Characteristics Maintained

Indeed, the graphite anode presents a startling contrast to the usual metal anode assembly. It is simpler, requiring less metal than is usually employed with metal anodes which must often be braced against warpage. Graphite, even at glowing temperatures, will not warp. Characteristics are therefore maintained at all times. So rugged is the graphite anode assembly that the glass and metal parts will be damaged before the anode proper is affected by extremely rough handling.

The machined anode is subjected to the unique chemical treatment prior to mounting. This treatment serves to remove the binder and other impurities, as well as amorphous carbon or loose surface particles. The anode is then mounted and introduced in the glass envelope, ready for bombardment and subsequent sealing off. Because of the high volatilization point of graphite, there is no danger of spattering or sputtering of anode material, as is often the case with usual nickel or molybdenum, especially when overheated for better degassification. The graphite anode can be heated far beyond its normal operating temperature, for thorough degassification. After sealing off, the graphite mass continues to act as a getter throughout the life of the tube, insuring a "hard", or high-vacuum, tube.



Two Sylvania sound tube types

Graphite Anode Advantages

The main advantage of the graphite anode resides in the matter of heat dissipation. Such an anode dissipates heat better than 50% more efficiently than the usual metal anode. This feature permits of smaller glass envelopes if desired, or greater power handling capacity with given types of tubes, or still again less strain on tubes operated at established capacities. The anode remains relatively cool at all times.

A cooler grid within the anode eliminates any danger of primary and secondary grid emission, as well as the release of gas by grid and other parts. With the maintenance of high vacuum throughout life, due to the continued getter action of the graphite, the positive bombardment of the filament is reduced to a minimum, which means that the thorium in thoriated filaments is consumed at a far slower rate, with correspondingly longer life. The absence of gas means no hissing, while the absence of leakage means no crackling noises, two features of prime importance in sound systems.

In conclusion, the graphite anode tube makes possible the following gains:

1. The tube can be processed and aged more critically than is common practice with metallic plate tubes.
2. Tubes can be made "harder" because of thorough bombardment of

graphite anode and subsequent getter action.

3. Higher plate dissipation without overheating.
4. Lower operating temperature at anode, resulting in lower operating temperature of other electrodes, preventing primary and secondary emission from grid.
5. Comparative freedom from gas, eliminating positive ion bombardment of filament especially destructive in the case of thoriated tungsten filament.
6. Uniform characteristics at all times and throughout long life, due to rugged anode and its non-warping feature.
7. Longer life and therefore greater economy in operation.

It is believed that this graphite anode development marks the most outstanding tube development since the introduction of the thoriated tungsten filament several years ago. The advantages of graphite are such that graphite elements may be increased in number and perhaps extended even to the smaller tubes in time. Meanwhile, however, the introduction of the graphite anode in such popular sound system tubes as the 205D, the 242A, the 258A rectifier and others, brings a new standard of performance and life into this important field of tube applications.

FEATURE TITLE EMBELLISHMENT

Hugo Lateltin

MEMBER, I. A. LOCAL 306, NEW YORK CITY

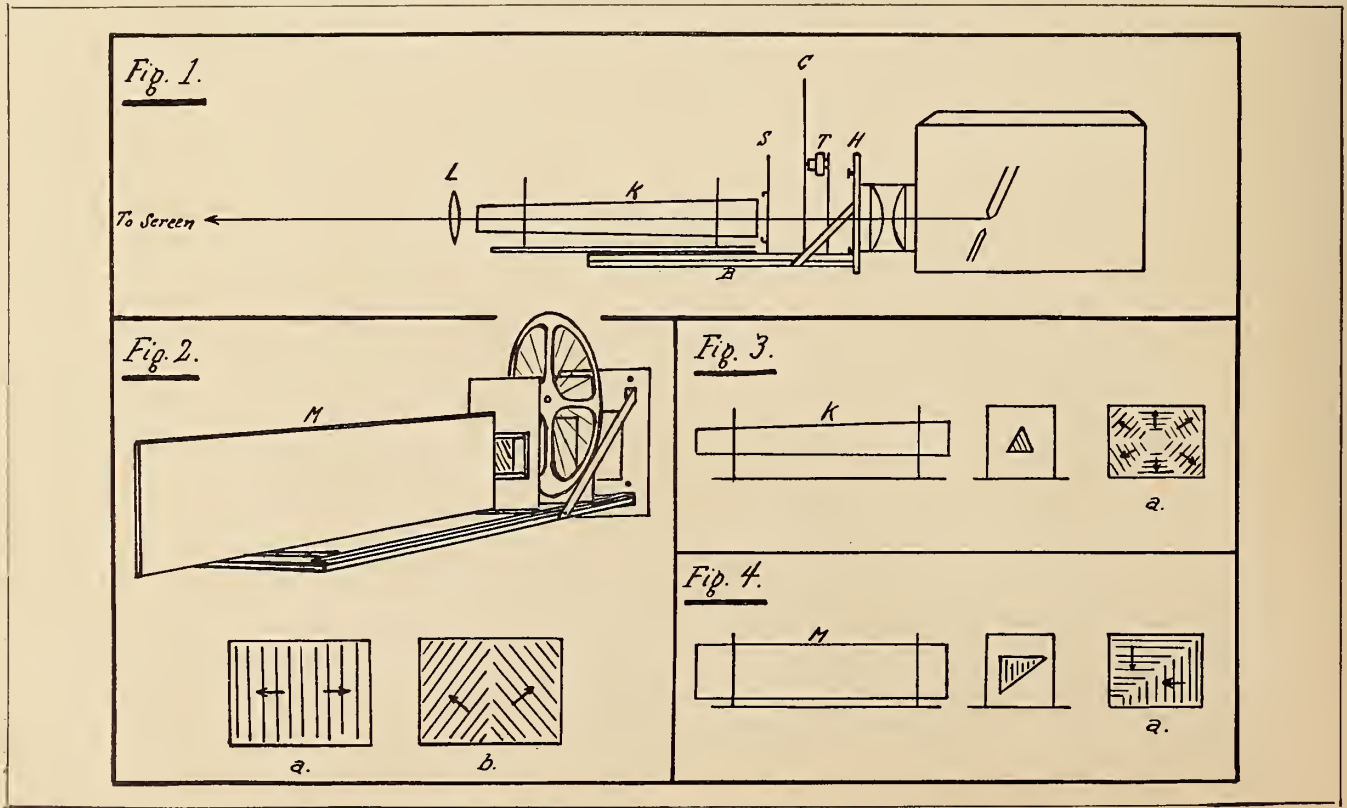
MANY theatres use special effect machines for the embellishment of feature titles. Commonly, a slide is projected on the screen through a gelatin filter or through a color wheel. The variety of changes and patterns obtainable with slides is necessarily limited. The mechanism described in this article provides a means for introducing a number of novel variations in lighting effects. The construction of the apparatus is simple and may be done at low cost. It can easily be made by a projectionist possessing some mechanical skill and who is interested in creating new stage effects and feature title embellishments.

The mechanism consists of an attachment applicable to any standard effect machine. It can be slid into the front holder (Fig. 1, *H*), of the lamp house. This holder usually measures 8 x 9 inches. A base plate (Fig. 1, *B*), is held rigidly by the back plate of the attachment. This back plate has to fit into the holder and should be provided with set screws at each corner to prevent the mechanism from wabbling. The base plate carries all the removable parts of the mechanism, such as color wheel, slide holder and any mirror attachments which may be used for different effects. Runners at the sides of the base plate make possible the free shifting of the removable parts.

Component Parts

Figure 1 shows a cross-sectional view of the mechanism. *H* is the front holder of the lamp house. *C* is a color wheel driven by a motor, *T*. If A.C. is available, a Telechron Clock motor has been found most reliable for the driving of the color wheel. *S* represents the slide holder, while *K* is a kaleidoscope, consisting of three mirrors. *L* is the projection lens which on all effect machines is firmly connected with the base structure of the machine. The focal distance lies mostly between 15 and 20 inches and therefore provides ample space for the introduction of different mirror arrangements between the slide carrier and the lens. It is best to cut the length of the mirrors just short of the focal length. This utilizes all the light coming through the slide. For ordinary purposes, plain mirrors of a fairly good grade of glass are quite suitable. If a sharp effect is desired, surface mirrors have to be used. Such mirrors can be obtained from any silvering establishment by specifying surface mirrors. These mirrors are silvered in the usual way, but the silvered surface should not be touched with shellac or paint, as this side will be used for reflection. Careful handling is necessary. The unprotected silver oxidizes slowly and can be used for reflection only for a few months.

Figure 2 shows a perspective view of the mechanism. At the right you see the back plate which fits into a lamp house holder. An opening in this plate



THE HISTORY OF THE ANIMATED CARTOON

Earl Theisen

THE history of the animated cartoon goes back farther than that of the motion picture; in fact, motion pictures had their beginning as hand-drawn pictures. Long before photography had become practicable, many devices were introduced that portrayed motion by a series of cartoon pictures. These early devices were nothing more than toys, and were impracticable for depicting a story; however, they were popular and did much to crystallize the demand for motion pictures.

Five years after the discovery of the "persistence of vision" by Peter Mark Roget, in 1826, the first attempts were made to show motion pictorially by a series of drawings. With a device, called the *Phenakistoscope*, invented by Joseph Antoine Plateau, motion was depicted by a sequence of drawings, fourteen in number, each drawing blending with the next in the series to show some simple bit of action. The device was composed of two disks mounted on a shaft, the front disk having a series of slits around its outer edge, while the rear disk carried the drawings. The drawings were aligned with the slits, and on peering through the slits as the two disks revolved the illusion of motion was created, simply but effectively.

'Wheel of the Devil'

This was followed by the *Daedaleum*, or Wheel of the Devil (Fig. 1), invented by William George Horner, in England, in 1834, which consisted of a shallow cylinder, mounted on a stand, having slits around the top. The drawings, made on strips of paper about 2½ feet long, were inserted on the inside of the cylinder. In these drawings, the chief character was the devil, waving his trident. The *Daedaleum* was later re-invented in France as the *Zoetrope* by Desvignes, in 1860. It came to be known as the *Wheel of Life* because it showed action, and portrayed little every-day happenings, such as a child jumping rope, or a man pumping water, or a cast of actors, including an erring husband, his wife, and her rolling pin. The rolling pin here used may be said to be one of the forerunners of the assorted "props" that are now so valuable to the motion picture. Many other events were faithfully recorded by hand drawings for the *Zoetrope*, which were motion pictures 2½ feet in length.

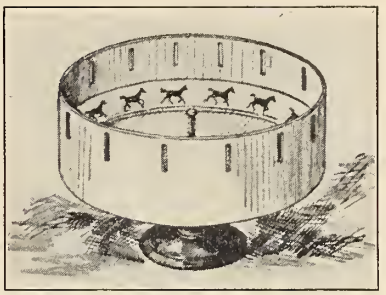


Fig. 1. The "Wheel of Life," one of the early devices for showing animated pictures

The *Wheel of Life* was first introduced in the United States by William Lincoln, in 1867, and was patented on April 23, 1867, which can be said to be the date of introduction of the animated cartoon into this country.

The most notable of the pre-photographic inventions was the *Praxinoscope*, devised by Emile Reynaud, in 1877, in France. To Reynaud goes the credit of

(*Continued on page* 28)

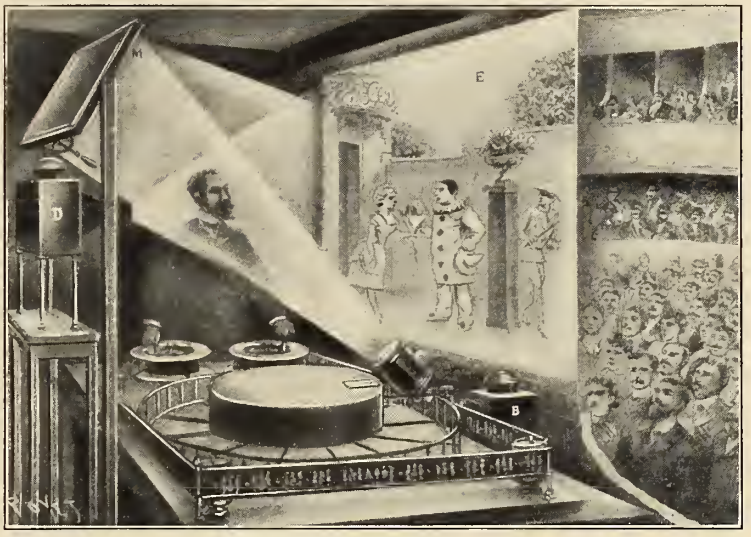


Fig. 2. Reynaud's Optical Theatre, showing an audience viewing the play

permits the light to pass to the color wheel and slide. The color wheel is placed a few inches away from the back plate and is followed by the slide carrier. The plates holding the slides and the color wheel are not screwed to the base plate but can be moved into any position. In figure 2 a mirror is mounted in front of the slide, which is partly masked. If we employ a slide of fluted glass, we find that the effect on the screen is as in Fig. 2, *a*. In this case the waves of the slide are vertical and the colors seem to divide from the center of the screen as is indicated by arrows. In Fig. 2, *b*, the waves of the slide are positioned at an angle.

Figure 3 shows the side and front view of a three-mirror kaleidoscope, as used in Fig. 1. The mirrors should be cut in the form of a keystone, with their width near the slide 2¼ inches, and near the lens 1¾ inches. The effect on the screen is shown in Fig. 3, *a*. This particular mirror arrangement has been found quite practical on feature titles which are not too strongly illuminated. It is well to use a mask some distance from the lens. Without a mask the whole stage will be flooded with light.

Figure 4 shows an arrangement similar to the one in Figure 2. The mirror in this case is not vertical but inclined at an angle of 45 degrees. Half of the slide is masked off. The arrows in Fig. 4, *a*, indicate the direction of the color when using a fluted glass slide in a vertical position.

An enterprising projectionist will be able to devise many new combinations. The three described herein are only part of the arrangements which can be placed between the slide and the lens. The simplicity of this mechanism lies in the easy interchangeability of the different effects. The suggestions in this article might be improved, as for instance, the kaleidoscope in Figure 3 can be constructed in such a manner that it will rotate around the optical axis.

Undoubtedly there are many projectionists who as a result of spending some of their spare time in experimenting with and testing out ideas for new screen effects, could contribute substantially to the foregoing discussion. Comment from such men would be more than welcome, particularly since there have been few if any advances in effect work executed from the projection room within recent years—and this is strange because effect work is extremely interesting.

The Code

OUR remarks anent code activities in Washington in these pages last month were purposely confined to statements of fact. We expressed no editorial opinion on the code, preferring to wait in the hope that by publication time for this issue the labor sections of the code would have been clarified through official rulings on the interpretations of code language which our story said were absolutely necessary to any intelligent understanding of the labor provisions.

Our exposition of a list of objections to the labor provisions of the code which were common gossip among numerous labor representatives aroused the ire of a certain group of people who seem to think that there is something sacred about this section of the code, and that the mere fact that they have lent their approval to the labor provisions makes it a most palatable tidbit to be swallowed whole by everybody in the projection field. While INTERNATIONAL PROJECTIONIST has no quarrel with any organization or any individual who supports an honest difference of opinion, it most emphatically does not subscribe to the belief that a motion picture code or any other proposition in the projection field is made right simply because somebody happens along who thinks it is right.

The editor of this publication has been charged with being an "obstructionist" because he dares to suggest that there exist deficiencies in the labor section of the code. While we think that this choice of descriptive language is unfortunate, it still will not serve to alter by so much as a comma any opinion we hold on the code. The business of this publication is to print news and to interpret the news by means of editorial opinions. This function we shall continue to discharge; and to those who happen to differ with our opinions we extend a cordial invitation to express their views in these columns at our expense.

It is said that INTERNATIONAL PROJECTIONIST is opposed to the labor sections of the code. Emphatically we state that this is not true. Our comment on the code last month follows:

> No worth while evaluation of the labor section is possible at this time. What can be said is this: If interpretations favorable to the cause of Labor are forthcoming, then the code will be considered eminently satisfactory by projectionists and stagehands; but if the interpretations placed upon the code language by Mr. Abner J. Rubien, a lawyer who handled the entire code matter for the International Alliance—if Rubien's interpretations are finally proven correct, then there are many projectionists who will consider the code to be thoroughly unsatisfactory. Time alone will provide this answer.

On this statement we stand. Nothing has happened during the past month to change our views as cited above. No official interpretations of code language have been forthcoming, thus we still are unable to accurately evaluate the worth of the labor sections.

Merely because the labor section provides for American Federation of Labor scales to prevail in communities where there exist A. F. of L. affiliates does not mean that the picture code is the "greatest code ever written". Nor does it mean that it is the worst. We think that the picture code labor provisions are very satisfactory—*IF*—if the official interpretations of code language are favorable to labor. We made this statement in our last issue, and we repeat it now.

The inclusion of A. F. of L. affiliates' scales as the prevailing scales in given localities is no more than projectionist and stagehand labor was entitled to. As a matter of fact, it can be said that this provision would have "gone over" within a week after the open hearings concluded if much valuable time had not been spent in chasing a will-o-the-wisp in the form of propositions—such as national two-men shifts—which practically every labor representative at the hearings knew didn't have a chance. We don't question the judgment of those who elected to attack along the line of national two-men shifts, explosive and fraught with potential danger as the topic was; but we do stick tenaciously to the statement that the first few days of the code hearings proved beyond the shadow of a doubt that this plan had died aborning.

This writer was one of the few who favored the A. F. of L. scale plan and was outspoken in support of it almost from the very start of the hearings. Every labor delegate at the hearings knew of this writer's espousal of I.A.T.S.E. scales as the prevailing scales and knew also of the stiff fight waged by this writer to win converts to the plan. Since this clause is now pointed to as the outstanding achievement of labor in the code, there certainly can be no criticism of the writer as an "obstructionist" on this score. We are not looking for credit as the author of the idea, since the truth is that the very same clause had previously been inserted in the legitimate code, and there appeared to be no good reason why it should not go into the picture code.

Still, Mr. Rubien, I.A. counsel, for weeks resisted the idea that such a clause should be inserted in the picture code, his stand being that it didn't have a ghost of a chance of "going over". Subsequent events proved Mr. Rubien wrong, yet we are not disposed to be critical of him in this respect, except when he blandly lays claim to originating the idea.

One other comment anent the labor sections comes to mind, and that the statement that it is manifestly impossible to obtain interpretations of code language before the code is signed by the President. This contention falls of its own dead weight, because if it be admitted that the language of the labor section is such as to require interpretation by NRA officials, then the thought immediately comes to mind that it might be dangerous indeed to subscribe wholeheartedly to any section the intent of which is vitally affected by interpretations that might subsequently be placed on the language therein. Our idea would be to insist upon clear-cut interpretations of code language before subscribing, and not *vice versa*.

Two pressing questions propounded in these pages last month appear to be slated for determination in favor of Labor. First, it appears likely that the phrase "prevailing scale" as used in the code will be held officially to mean *scale per theatre*, and not *scale per man*. Also, indications are not lacking that "existing legitimate contracts" between Labor and employers will take precedence over the code. While this information has been obtained from a usually reliable source, INTERNATIONAL PROJECTIONIST desires to emphasize its unofficial character.

With the clearing up of these two vexing questions, the code begins to assume a very much brighter hue from Labor's viewpoint. While there still are several other questions remaining unanswered, the only major concern relates to the matter of who shall pay for the overage in hours beyond the 40-hour maximum established by the code. This publication considers this a very important question, and one in which plain intent of the NRA should have operated to produce a ruling favorable to the working man. It certainly seems unfair to ask a man who now is working 46, or 47, or 49 hours a week (and some stagehands are now working 50 and more hours weekly), to reduce his work week to 40 and at the same time accept a corresponding reduction in salary. NRA never was intended to effect a result of this sort, and irrespective of what unsavory charges are next hurled in our direction, we shall continue to make the statement that some provision should be made for an adjustment of salaries on the overage in hours.

An answer to us on this item might be that while it is

EXPECT CODE INTERPRETATIONS FAVORABLE TO LABOR

James J. Finn

THE motion picture code still is unsigned by President Roosevelt, six weeks after the "absolute deadline" set by NRA officials and industry leaders. It appears likely, however, that the Presidential signature will be affixed to the document by November 30 at the latest, ten days following which the code provisions will become effective.

While Administrator Johnson is known to be opposed to the 56 wage scale classifications contained in the proposed code draft—his opinion being that four major classifications are sufficient—it is generally understood that there will be no material changes in the exhibition labor section of the draft as published in these pages last month. The delay has been occasioned by differences of opinion among NRA officials as to certain film-buying clauses which are held to be in conflict with previous Federal Court decisions, as well as by the necessity for considering carefully the proposed limitation on film star salaries.

No "Official" Interpretation

Independent exhibitor ranks have been split wide open by the code, with the M.P.T.O.A. showing every evidence of a willingness to go along, while the Allied group still breathes opposition and hints defiance now and after the code is signed. The position of the major producers and distributors, including the Hays organization, remains the same in favor of the code.

No official interpretation anent the intent of certain clauses in the exhibition labor section has been forthcoming from the NRA headquarters, and no statement relative to these much-discussed interpretations has been forthcoming from the International Alliance of Stage Employees and Moving Picture Machine Operators, parent body of some 700 local unions throughout the United States. These questions as to the intent of the exhibition labor clauses are (1) who is to pay the cost of any overage in hours beyond 40, the maximum set by the code? (2) whether existing contracts, signed either before or since August 23, the date specified by the code, prevail over the code or are superseded by the code (3) whether the phrase "prevailing scale" (Section 6a and thereafter) may be taken to mean scale *per projection room* or scale *per man* and (4) whether the phrase "prevailing scale" refers to basic contract price as of August 23, or to basic contract price *less* a given summer cut, which in many instances ran beyond August 23.

Labor representatives are also concerned about the provision for inclusion of non-union men on the arbitration board which will consider questions as to what really is the "prevailing scale" of an I. A. affiliate, as mentioned in the code, and not a little concern is being felt about the no-strike and "agree to mediate" sections of the proposed draft. INTERNATIONAL PROJECTIONIST has exerted strenuous efforts to obtain authoritative answers to the foregoing questions, but to no avail, it being apparent that the mantle of secrecy which cloaked the codifying activities in Washington still endures.

Overages in Hours

This publication did learn unofficially, however, that all "legitimate contracts executed prior to August 23" will hold good until their expiration, and that "prevailing scale" as written into the code means *scale per theatre* and not *scale per man*. While this information was obtained from a very reliable source, this publication desires to emphasize its unofficial character. On the question as to whether "prevailing scale" may be taken to mean *basic contract price* or *contract price less summer cuts*, no reliable information could be obtained. There appears to be an outside chance, however, that the basic contract price will prevail in all cases.

Relative to the question as to who

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true that a small minority must accept a wage cut as a result of no adjustment in wages being made, it all simply boils down to a question of the few suffering so that a large majority might gain something. This is a perfectly logical answer; but it is our stand that it is unnecessary for any man to suffer a wage cut—or at least, that some idea as to the number of men affected should be had before endorsement is given to the plan.

Considered generally, it is apparent that the code will prove a boon to the International Alliance in the way of providing a magnificent opportunity for intensive organizing of present non-union theatres, in addition to attracting to the I.A. many non-union projectionists. The membership possibilities are staggering, viewed on a countrywide basis, and it is plain that the I.A. already is preparing to take immediate advantage of the situation. Since a given theatre in a particular community will have to "up" its scales to match the I.A. local union scale in effect in that community, the organizing possibilities are readily apparent. It seems unlikely that a theatre which in any event will have to pay I.A. scales will elect to go along on a non-union basis. Some trouble may develop in localities where wage scales have to be set.

The "no strike" and the arbitration clauses of the code are not to the fancy of many Labor men, yet it is evident that Labor simply had to give some assurance of industrial peace in order to gain the advantages it did. This publication is not enthusiastic about the arbitration provisions, which open up avenues leading to intensive squabbling on a wide front. Labor never has had the best of it in any arbitration proceeding, and it appears extremely doubtful that the immediate future under the code will see a general improvement in this condition. The next few months will provide the answer to this at the moment open question.

One very important code clause which until now has induced little comment is that which provides that manpower must not be cut below the level which existed on August 23, 1933, which provision also was a feature of the President's Reemployment Agreement (or blanket contract, so-called), but which now is cinched by the code.

In conclusion, we repeat that organization policies on the score of codes or any other matter are not our concern, but we desire to emphasize anew that the results of organization or individual policies on matters which affect profoundly the destinies of thousands of workers within the projection field always have, do now and will continue to excite our interest to the extent of printing the news thereof and, if we choose, interpreting that news editorially.

JAMES J. FINN

shall bear the burden of the overage in hours beyond the 40-hour maximum set by the code, in communities where either no contract exists or there is a difference of opinion between the union (I.A. affiliate) and exhibitors as to what actually is the wage scale for the various classes of theatres, it appears reasonably certin that the burden of costs will be borne by the various local unions so affected, through the medium of the men now employed having to take a wage cut to the extent of the number of hours they now work over 40 weekly. This proposal was explained in detail in these pages last month.

Taking notice of pointed criticism voiced in certain quarters to the effect that the action of this publication in directing attention to the question of the overage in hours, among other things, was in the nature of "a smoke screen" and an "absurd and silly reflection on the greatest code ever written", this writer has examined carefully the codes, proposed or approved, for other industries and has uncovered some interesting data relative to this very question.

The following excerpts from codes of representative industries are illuminating in this respect:

Woolen Industry, July 26— . . . Wages for 40 hours are to be not less than wages paid for a 48-hour week.

Corset and Brassiere Industry, August 14— . . . If hours of labor are reduced by code requirements, rates of pay must be adjusted so as not to reduce compensation.

Coats and Suits (Women's), August 4 — . . . The compensation for employment shall not be reduced even though hours of labor may be reduced.

Hosiery, August 26— . . . length of shift may not exceed 35 hours a week and employees must be paid the same wage for a 35-hour week as if they worked a 40-hour week.

The foregoing citations are indicative of similar provisions embodied in many representative industry codes, and should serve to effectively silence those critics who have maintained that there existed no precedent for adjusting the burden of an overage in hours set by a code.

Overtime has been an important revenue-producer for projectionists, but the proposed motion picture code makes no provision for overtime work and compensation therefor except to state vaguely that the 40-hour maximum work week established shall not apply to "emergencies"—whatever this may mean—and whoever shall be recognized as having the right to declare that an emergency exists. This writer can think of any number of situations that might arise in a projection room to which the term "emergency" might be applied, and he can also visualize sharp differences of opinion on the part of managers and projectionists as to what really constitutes an "emergency".

The code for the *Photographic Industry*, approved on August 19, provides that "repair, outside and cleaning crews shall be paid time and one-half for all time over 40 hours", thus establishing a precedent for overtime payment, a point not even considered in the motion picture code exhibition section.

Projection Wages and Others

Exceptions to these citations have been made on the ground that the motion picture operator occupies a "unique" position in that his wages are so high in general that he cannot be classed with the "ordinary run" of labor. This observation is made to appear ridiculous by figures which show that out of a total of 252 wage scales included in the original I.A. proposal, 162 (or 64%) of the total scales called for *less than $35.00 per week*. Still another 8% of the total called for wages ranging between $35 and $41.

The explanation for this preponderance of low scales, of course, lies in the fact that the original I.A. proposal included a general two-men shift provision, each shift to be made up of a No. 1 man and a No. 2 man, with No. 1 man to receive on an average of $11 more per week than the No. 2 man. Had this proposal been adopted by the code authorities, local union leaders would have been confronted with the necessity for splitting their memberships into two groups—No. 1 and No. 2 men—or in other words, reintroducing the alleged inequalities of the permit system on a national scale. It is doubtful if this proposal would have stood up in a court test of its legality, discrimination being apparent at a glance.

Another interesting comparison may be drawn from the fact that the code presently provides that chorus girls, whose craft hardly can be considered more exacting than that of projection, will receive $30 a week in permanent production work and $35 weekly while on the road.

Particular attention was paid to the announcement by Deputy Administrator Rosenblatt to the effect that Labor (meaning the I.A.), will not be represented on the Code Authority, the personnel of which has not yet been revealed but which is expected to be confined to producer-distributor-exhibitor ranks. The importance of Labor representation on all code authorities is stressed by the American Federation of Labor in the following statement:

> "Wage earners, although co-equal with capital as a producing essential, are in almost every code ignored in setting up the continuing code authority for the industry with power to legislate. As codes will provide industrial government, the *significance of this situation is very grave*. (Italics ours.) Workers as such should have representation on the code authority on an equal footing with all other members."

This shortcoming of the motion picture code, from the labor point of view, has already been pointed out exclusively by this publication.

The point was often made during the code hearings in Washington that the NRA could not and would not write into the picture code any clause having to do with "conditions of employment", which phrase, so far as the projection field is concerned, relates specifically to the current controversy anent one-man vs. two-men operation. Of a piece with these rantings was the oft-repeated statement to the effect that it would be "utterly impossible" to include in the code any reference to American Federation of Labor scales as the "prevailing scale" for a given community. Still, weeks later the provision went over as smoothly as it would have five weeks previous, and those who had shouted the loudest that it was "impossible" were the first to claim credit for its inclusion in the code. On the point of writing into the code conditions of employment, this prerogative on Labor's part needed no further justification than a portion of the National Recovery Act itself (Section 7, b):

> "The President shall, so far as practicable, afford every opportunity to employers and employees in any trade or industry . . . to establish by mutual agreement the standards as to the maximum hours of labor, minimum rates of pay, and such other conditions of employment as may be necessary . . . to effectuate the policy of this title . . . "

Intense opposition from independent

Code Signed!

The motion picture code was signed by President Roosevelt at Warm Springs, Ga., on November 27. Its provisions will become effective within ten days, or on December 8. Although official publication of the code draft as approved by the President was withheld, authoritative advice to this publication indicates that there have been no changes in the exhibition labor section of the code as published in full in these pages last month.

theatre owners developed over the two-men shift proposal, particularly from those exhibitors who are presently using non-union men. The argument over this proposal disclosed that only 35% of the independent theatres in America have been organized by the I.A.

Two-Men Shift Figures

Numerous inquiries received by this publication for some light as to the reason for the shelving of the two-men shift proposal focus attention on the following current figures relative to one-man and two-men projection shifts throughout the United States:

I. A. Union Theatres	Non-Union Theatres
75% One-Man	99.5% One-Man
25% Two-Men	.5% Two-Men

Publication of these figures undoubtedly will occasion considerable surprise within the craft, particularly among those projectionists who work in big cities, a majority of which enjoy two-men conditions. The figures also are indicative of the inroads that have been made upon craft conditions within the past couple of years and constitute ample evidence as to why the original I.A. proposal for national two-men shifts was foreordained to failure.

Many observers were inclined to question the wisdom of asking for a national two-men shift in the face of the foregoing figures, which were available in advance, the argument put forth by this group being that it was suicidal to set up a proposition that was certain to be knocked down and thus afford exhibitors in localities now using two-men shifts an opportunity for answering union demands, now or in the future, with the statement: "Why, that proposition was up for consideration in Washington and was kicked out the window, not by us, but by Uncle Sam".

That the code in its present form provides the I.A. with a splendid opportunity to do intensive organizing work is freely admitted by even the die-hard non-union exhibitors. On the basis of that clause which provides that the "prevailing scale" of an I.A. affiliate in a given town shall be the *standard scale* for the various classes of theatres in that community. it is evident that the present non-union theatres will have to jump their scales in order to conform to the prevailing I.A. local union scale as of August 23. This being so, it is not inconceivable than an exhibitor in any town where there exists an I.A. local union will prefer to use I.A. men, since he must in any event pay the prevailing I.A. scale.

Should the code work the other way in that an exhibitor might prefer to retain in his employ the present crew of non-union men, the chances for the I.A. reaping rich rewards from a membership drive are excellent.

It developed during last month that the August 23 date mentioned in the code as applying to I.A. scales was not an arbitrary selection of Deputy Administrator Rosenblatt, nor was it chosen because the tentative code draft was presented to him on that date. From reliable sources this publication learns that Rosenblatt would have been quite agreeable to making this date July 1, or June 1, or any other date within a reasonable period preceding August 23, and that his final adoption of the latter date was predicated on the desire of the labor representatives that he do so. INTERNATIONAL PROJECTIONIST also learned that

(*Continued on page* 20, *col.* 1)

The I. A.'s Views on Code

OF interest to projectionists generally are the following excerpts from the current issue of the *Official Bulletin* of the International Alliance relative to the proposed motion picture code:

It is unfair to dilate too generously upon the major and minor tenets of our . . . code.

Frankness compels the statement that it is neither perfect nor an instrument of torture.

If it is true that in some minor sense certain economic interests of ours are impaired, it is also equally true that in a larger sense the prestige of the I.A. has been enhanced and the economic interests of its membership given a codical protection hitherto unknown.

Some critics (outside our organization) have been unfair, unkind and unjust. They have stigmatized the efforts of our General Office and the assistance of a host of splendid I.A. men who journeyed to Washington . . . Their intimations have been grossly unfair. Their innuendoes have been sickeningly petty. We trust that they will voluntary regret indulgence in such ungenerous criticism.

. . . codification was a series of violent headaches to your G.O. staff. We can conscientiously say we worked at the job to the extent of our ability. When we took recreation it was because recreation was a stark necessity. Codes are hard, very hard on the nervous system.

That the I.A.T.S.E. made some concessions goes without saying . . . But it is patent that the NRA law in general will be advantageous to the I.A.T.S.E. in prestige and practical advantages.

Labor Section of a Code 'Lousy Deal', Says Miller

ONLY a promise stands between nationwide operators and stagehands strikes under the code as it is now written, said Jack Miller, chairman of the national exhibitors labor committee at the Washington code hearings, in a speech before the annual convention of the Wisconsin M.P.T.O.A. Asserting that the original code clause banning strikes and making arbitration compulsory had been dropped from the final draft, Miller said that while he considered the no-strike promise legitimate, "it is just that and nothing more".

Excerpts from the address of Miller, a former B.A. of Chicago Local Union 110 but for many years past an exhibitor, follow:

"All we got," he said, "was a promise from Lou Krouse to take local autonomy privileges on strikes from the hands of business agents and making the question determinable by him as vice-president of the I. A. T. S. E. That's swell and I believe Lou means it, but after all, it's only a promise, and Krouse may live six months or an hour and a half. Who knows?

"I went to Washington full of hope. The code was to be the Moses leading us out of the wilderness of labor. It didn't take long to find out labor was running the NRA and the whole show. I'm telling you there aren't enough brains in the A. F. of L. to run the A. F. of L., so how is it going to run the government? If the government lets the A. F. of L. continue to run the works, there's no hope. I predicted more strikes in the next six months than in the last six years and the first six weeks of those six months proved I was dead right with plenty to spare.

Code a "Lousy Deal"

"Can you imagine a government ruling a wage scale arrived at by violence and theatre bombing is to prevail as long as the NRA stays? That's what it has done. The code says Aug. 23 wage scales are to prevail, but does it mean that? It does not. It means wages can't go under that scale, but doesn't prevent unions from trying to get more. We came out of Washington not with a good deal; we came out with a lousy deal.

"There is only one way to beat this labor thing and that is for employers to organize as strongly as employes. If you don't want to pay ushers $25, doormen $35 and cashiers $25 a week you'd better wake up, and if you don't that's what you're going to get."

Miller said the A. F. of L. had 16,000,000 members during the war when industry had to move and nobody worried much about wage scales.

"But when the war was over and fellows looked around, the membership dropped to 1,600,000," he added. "Now you've got the NRA and the total has hiked to over 5,000,000 already. It'll be back to that 16,000,000 if you lunatics don't do something about it."

NOTE: *The peak A. F. of L. membership was in* 1920 *when it reached* 4,060,000, *thus Miller's* 16,000,000 *figure has no basis in fact.*—Editor.

the National Labor Board was somewhat surprised to learn that there existed any opposition in Labor ranks to certain code provisions, inasmuch as John P. Frey, the picture code labor advisor, had informed them that it was eminently satisfactory.

It was reported also, that the National Labor Board was at loss to account for the failure of the picture code to provide for an adjustment of wages with respect to the overage in hours beyond the 40-hour maximum set in the code.

Investigation by this publication failed to disclose any basis in fact for the story which appeared in certain exhibitor trade papers to the effect that responsible I.A. officials had given assurances, both to Rosenblatt and the exhibitors, that a revision downward would be okayed by them in cases where present scales were demonstrated to work hardship on exhibitors. This story was given prominence in the trade press, but it appears to be an unsupported fact.

One thing is certain, however, and that the promise given to the NRA by union officials relative to future acts of violence by organized labor unions which may find themselves in disagreement with exhibitors. The code itself, of course, prohibits strikes pending arbitration of a given dispute, and it is certain that any acts of violence while a dispute is being arbitrated will result in summary punishment for the offender.

The plain import of the "no strike" clause is to impose governmental authority over all labor unions, irrespective of what form of milder language may be employed to describe this section. Heretofore, if a local union reached an impasse with an exhibitor, it could immediately "strike" the theatre or theatres in question. All this is a thing of the past under the code provisions.

It is well known throughout the trade that no I.A. local union, now or in the past, could strike without express permission of the I.A. General Office, thus the present excitement in the exhibitor trade press anent the "intention" of the General Office to "take away this privilege" from local unions in future, in accordance with promises supposed to have been extended to both the A. F. of L. and the NRA, is so much hokum. It has ever been thus.

Elsewhere in this article appears certain excerpts from the current *Official Bulletin* of the I.A. which throw some light on the position of this labor organization with respect to the code.

When and if the proposed motion picture code is signed by President Roosevelt, and this action is expected even as these lines are written, INTERNATIONAL PROJECTIONIST will endeavor to distribute generally among its readers a special bulletin which will include any material changes effected in the labor sections of the code since its third, and so far as is now known, final revision.

PROJECTION ROOM SWITCHES

Sidney Wein

AMONG the most important elements in a projection room are the various switches in use therein—yet a majority of projectionists pay very little attention to this item. Switches that are faulty in design or manufacture, or that have been worn to an extreme degree, have often proved troublesome, and in several instances have been known to stop a show. All projectionists know that switches are replaced only when they are burned out or become so troublesome as to be inoperative.

So difficult has it been during the past several years to obtain room equipment that might be described as absolutely indispensable to the operation of the show, that many projectionists never give a thought to room switches. The penny-pinching manager (who is only acting on orders from "up above"), has no means of knowing the importance of the various projection room switches, this being the responsibility of the projectionist.

Of course there is no hope for that type of manager, encountered by this writer, who said: "If you do not have spare parts available, you will not have breakdowns". Still it is not inconceivable that much of the difficulty experienced with switches is due to the fact that some projectionists do not understand what causes a switch to burn out.

Arc Lamp Switch

The arc lamp switch is the one most likely to burn out, and there are several reasons why this is so: lugs not clamped down tightly enough on the binding posts; wires not soldered properly into the lugs, and excess heat, caused by the wrong size wire or the wrong size switch. Excess heat takes the temper out of the spring washers on the switch, inducing undue arcing in the hinge part of the switch and inevitably causing the latter to melt. This can happen when the wire or switch is below the proper carrying-capacity for the amperage being used in the arc.

This writer recalls one instance of where a 100-ampere switch was used on a certain hi-low lamp, which was replaced with a high-intensity lamp using 130 amperes. Although the projectionists requested the proper size switches at the time the change in lamps was made, and have renewed this request many times since, the 100-ampere switches still are in service. The burn-out on this job probably will occur when the theatre is filled with cash customers.

Another not infrequent cause of a burn-out is the pleasure experienced by some projectionists in seeing the long flash of fire that issues from the switch-box when the switch is pulled out very slowly as the light is killed. (The writer didn't believe this possible, either, until he witnessed such a performance himself.)

For long life, a switch should be the right size for safely carrying the amount of amperage used, and all wires in the circuit also should be of the proper carrying-capacity. It is important, of course, that all contacts should be as tight as possible. A little grease or vaseline on all working parts, such as the hinge and fork parts, prevents and absorbs arcing. See to it that the spring washers have not lost their tension and if there be any doubt as to the tension, replace the washers immediately. Proper tension is essential in the fork part of the switch, at the point where the blade fits in to make the contact, a lack of which tension causes undue arcing. Last, but certainly not the least important rule, be sure to pull out the switch with a snap when killing the arc. Remove the pitting on the blades with a fine file or with emery cloth.

Emergency Repairs

Regular inspection and a little care will prevent switches from burning out under ordinary operating conditions. Should an arc lamp or motor switch burn out during a show, the best means to remedy the difficulty quickly is to connect the wires straight across, just as though there were no switch—the positive being connected to the positive, and the negative to the negative. After taping the connections, the main switches on the panel board may be used. This advice is directed to those projectionists who work in theatres where there are no spare switches on hand—and there are innumerable such theatres.

Finally, it is suggested that in those sound systems where there still are several switches on the same line, as many of these switches be jumped as is possible—cut out entirely—as such switches are potential noise and trouble makers, and there appears to be no good reason for their being retained in the system.

'AUTOMATIC' CHANGE-OVERS NOT PRACTICABLE NOW

George C. Edwards

FORMERLY EDITOR OF "AMERICAN PROJECTIONIST"

FREQUENTLY I am asked to look over automatic devices to correct the change-over from one reel to another, with accompanying sound. In recent months these new devices have greatly increased in number, and each of the inventors has apparently had but a single thought in mind: "I will make a fortune out of the patent." Some of these devices are ingenious in their make-up, some crude in design and of dubious value and some just nightmares for anyone who attempts to work with them.

Even if these change-overs were thoroughly practical, the inventors or promotors are over-enthusiastic about their financial possibilities and apparently have not heard the old saying, accepted as gospel in the Patent Office, that "the first three men who exploit a patent lose their shirts, the fourth may get a little and the fifth stands a chance." Independent inventors have found out by bitter experience how true this is. Companies having ample resources which maintain research bureaus and laboratories do not fare so badly, for their patents are generally improvements in or developments of already manufactured apparatus. Even such concerns rarely make any money until they have spent large sums, waited a long time for results and have well organized facilities for marketing their product.

Film Condition Controls

Thanks to the Standard Release Print, the start-motor and change-over marks are printed on the film at the correct position for a perfect change-over. All that is necessary is to give proper attention at the right time and, with a certain amount of manual dexterity, the job is easily done. Mistakes can be and are made. But when men are skillful and interested in their work the possibility of error is slight. As motion picture film ages in service, complications arise due mainly to the mistaken idea of many men that *their* change-over marks are the *ideal* ones; they persist in adding them to those that come with the film and properly belong there. After a period of service the film has a choice collection of scratches, stars, crescents, crosses, etc., all punched into the film and in different frames. This form of mutilation may extend anywhere from four to thirty feet back from the end of the reel. To attempt to remove them would, of course, not only practically ruin the continuity of the picture but also would mean removal of the ending of the dialogue.

The inventors previously referred to now propose to introduce an attachment which will automatically make a *perfect* change-over in picture and sound. What a chance! If the ideal condition existed, as pictured by an inventor in his dreams, that "every projector in the country was equipped with his apparatus on the same day," there would be a chance for the device to successfully accomplish that which it is supposed to do. Under actual conditions, however, the change-over would seldom, if ever, occur at anything like the correct spot and very often not at all. One of the devices shown operated twice in the first one hundred feet of film, and this was due to a notched sprocket hole. Another operated by a "flasher frame" in the picture, that is, escaped development and appeared as a clear frame. Still another was a measuring device which failed three times out of four.

The inventors all overlook the fact that hardly ever does the film arrive at the theatre in perfect condition and that no automatic device will work consistently well if the film is not in perfect physical condition. After two or three runnings 98% of the film is mutilated in one way or another, and the slightest mutilation may well render the device worse than useless.

It requires two competent, conscientious men, closely watching the screen, to make a perfect change-over manually, one to make the change and another to check the markings as they come through. A blink of the eye and the marking is entirely missed. Theoretically, the projectionist should never blink his eye while on duty, but considering the conditions under which they work it is amazing that some of them have any eyesight left. The markings on the Standard Release Print appear and disappear in one-fifth of a second, which calls for a sharp eye and close attention, if "blanks" are to be avoided.

Manpower Important

The average house manager would, of course, welcome an automatic device, as in his opinion it would be a fine justification for going back to the old and dangerous practice of one-man operation. The Standard Release Print markings have much to recommend them, but they are a great strain even to the projectionist who is giving all the skill and attention which we have a right to expect from any human being.

The manager or projectionist, however, who places the correct value on expert handling of the show, finds that it is foolhardy to place any reliance in a so-called completely automatic change-over. Too many variables enter into the situation, and of these the film itself—that is, its physical condition—is by far the most important factor.

W. E. CINE TIMER TAKES 3,000 CLEAR PHOTOGRAPHS A SECOND

THE Western Electric Cine Timer, developed jointly by Bell Telephone Laboratories and Eastman Kodak Company, is an entirely new tool for the study and analysis of high speed phenomena. It is a combination ultra-high speed 16 mm. motion picture camera and an electrical equipment for registering time. The camera has two lens systems, so arranged that when the camera is used to photograph any occurrence, the moving dials of the time register are also simultaneously photographed on each frame of film beside the picture. Upon viewing or projecting the film so made, the moment at which any event happened can thus be read immediately from the direct time record given with the picture of the occurrence.

The camera is capable of taking as many as three thousand clear, sharp photographs each second and the timing system records time at intervals of one thousandths of a second with an accuracy rivaled only by the finest of laboratory-type crystal oscillators.

Through the use of the Cine Timer the operation of complicated mechanisms invisible to the eye because of the high speeds involved become visible when photographed and projected on a large screen with a reduction in speed amounting to as much or more than 180 times. The eye is able to follow every motion of each moving part of the mechanism under study and to detect instantly the faulty operation and to time each sequence of events in the thousandth part of a second.

Constructional Details

The Cine Timer is supplied in two models. Type 1, equipped with the high speed camera, has a speed range

of from 30 to 250 photographs per second and records time in minutes, seconds and hundredths of a second. Type 2, equipped with the ultra high speed camera, has a speed range from 30 to 3,000 photographs per second and records time in seconds and thousandths of a second. Readings may be made down to one ten-thousandths of a second.

The camera is of the continuous type, uses standard 16mm. film and is electrically driven, affording continuous operation up to 200 feet of film. It may be used on any tripod, and can be moved and tilted in any position while in operation. No difficulty is experienced in providing enough light for good film exposure, even when the camera is operated at top speed. Pictures have been taken indoors with a single 500-watt lamp which possess fine detail and photographic quality.

Time Recording Apparatus

The time is recorded by a precision electric clock driven by a current generator which consists of an electrically actuated tuning fork. The fork's amplitude of vibration is kept well within the elastic limits of the steel of which it is constructed. The temperature of the fork is controlled with a thermostatic element built in the fork which is housed in an insulated chamber to minimize heat losses and to guard against quick temperature changes. In temperatures from about 40 to 90 degrees fahrenheit, the current has a cycle precision of better than one part in 100,000.

The Cine Timer has distinct advantages over stroboscopic light methods in that a permanent record is available and a record of non-recurrent or transient phenomena is made possible. Pictures of luminous objects and objects out-of-doors may also be made.

Graphite Anodes a Feature of Sylvania Tubes

ANODES or plates of pure graphite are the distinguishing feature of the entire line of Sylvania low-power, intermediate and high-power air-cooled transmitting tubes. A process developed in the Hygrade-Sylvania laboratories at Clifton, N. J., produces a one-piece anode of pure graphite, with all amorphous carbon and other impurities removed. This exclusive treatment insures freedom from harmful carbon deposits on filament, insulator and presses experienced with ordinary "carbon plate" tubes.

Several Major Advantages

In the present tubes the graphite plate is machined out of a solid block of carbon and subsequently treated before mounting. Ruggedly supported and bolted in position, the graphite plate will not warp or vary the tube characteristics irrespective of operating temperature or age or rough handling.

Several major advantages are claimed for the graphite anode tube over the usual metallic plate tube. First, a 50 per cent greater heat dissipation due to the high thermal emissivity of graphite. This means the ability to handle greater overloads when necessary, or normal loads without overheating, or again smaller tubes if desired. Second, a lower operating temperature at the anode means lower operating temperature of other electrodes, preventing primary and secondary emission from the grid. Third, remarkable uniformity of characteristics, for graphite does not warp under high temperatures. The one-piece construction eliminates high-contact resistance found in other forms of construction. Fourth, long life and comparative freedom from gas. The tube remains "hard" or at high vacuum, throughout service life, because the graphite anode is a "getter".

Originally introduced by Sylvania and tested in larger air-cooled tubes, the graphite plates are now being incorporated in all Sylvania air-cooled transmitting tubes.

What is Back Of The Christmas Seal?

Dwight Anderson

Each year INTERNATIONAL PROJECTIONIST is glad to open its columns to the National Tuberculosis Association, the splendid work of which organization is financed by the sale of Christmas Seals. Many projectionists have experienced the beneficence of this organization, have learned of the great power exerted by the tiny Seal. This year the need is greater than ever; and so too will be the satisfaction of those who can afford to buy Christmas Seals.—Editor.

TURN over in your hand the little Christmas Seal, and what do you find? Glue. That is there to make it stick. As Josh Billings said of the postage stamp, it "sticks to one thing until it gets there."

In the last few years, when everybody lost faith in something, and some people lost faith in everything, the little Christmas Seal stuck. It stuck to the job of discovering cases of tuberculosis early enough to help them, of preventing the disease from going from the sick to the well, of building up resistance among children, and among grown-ups who were needy. The disaster of disease was not to be added to the distress of poverty.

The Christmas Seal stuck because the people of the United States were willing to tax themselves voluntarily to pay for community health. Some people, forced to take their exemptions, could not pay this tax. Others, because of diminished income, paid less. Most people stepped right up to the window and contributed their bit just as before, and there were those who doubled the amount. Nobody evaded the tax. Nobody could evade a tax which he himself imposed.

There is a great deal back of the Christmas Seal besides glue, that makes it stick. For one thing, people know that the death rate from tuberculosis is going down—that it has gone down despite hard times—and yet that the battle is not won when the disease still fills to capacity 398 public sanatoria in the United States, and more people die of it in the first decade of maturity than from any other ailment. People know that for 26 years the Christmas Seal has financed much of this struggle. Great progress has been made. But everybody realizes that when a runner comes in sight of his goal is just the time to speed up instead of slowing down. The goal of the Christmas Seal is ultimate elimination of tuberculosis. Now is the time to give it increasing support.

And people know, too, that in their own communities certain definite and specific things are done with the money raised; that local persons whose probity is unquestioned, have charge of the disbursement of funds; that this is done with the advice and skilled help of the leading health authorities of the country, outstanding experts with many years of successful experience to their credit.

These people who sponsor the seal sale in 2,084 associations and committees are the important factor back of the Christmas Seal. And back of them are the achievements of the last quarter of a century, plain on the face of the record. No man, no institution, stands alone. We want to know of a man, who it is that is back of him; we want to know of an institution, who and what is back of it. Because almost everybody knows this about the Christmas Seal, it sticks, and will continue to stick through weather, fair or foul, until at last it gets there. When this happens, tuberculosis will become a disease to be found only in the libraries of medical science.

Buy Xmas Seals

GREATER EFFICIENCY WITH PRESENT D. C. ARCS

Joseph E. Bliven

MEMBER I. A. LOCAL UNION 439, NEW LONDON, CONNECTICUT

IF the direct current arc light is properly stabilized by the injection of proper chemicals and earth oxides in the carbon to the extent of creating a greater overall efficiency per watt input, I believe that a greater incandescence can be had and a more brilliant white light obtained.

The electronic flow could be directed in a more concentrated manner, either by creating a greater electro-magnetic or electro-static field around the carbon in such a way as to cause the electrons to be driven against the positive carbon tip, causing the terriffic impacts to bombard the carbon into a white incandescence, thereby utilizing not only the regular gaseous ball between the electrodes but directing the tail flame to a more useful purpose.

The chemicalization of carbons would occasion a more useful life and insure a greater lumen factor per watt input. If this work were intelligently handled by both the carbon people and lamp manufacturers, we ought to be able to get as much and as good a light at 75 amperes as we are now obtaining with 150 amperes. Incidentally, it is my personal belief that we are not now getting a watt lumen output that can be compared on any rational basis with the cost.

Some years ago I utilized with direct current a combination of regular cored upper carbon (positive), and the special A. C. white flame lower carbon as a negative in a vertical lamp. The difference in illumination between this combination and the conventional one was astonishing. I secured a brilliant white light with a sharpness of field which matched the results obtained in the recent demonstration before the S. M. P. E. of the new National A. C. carbon. I have been told that I must be mistaken regarding the results of my little test, but the quality and quantity of light produced was the best answer to these critics. Mr. F. H. Richardson can verify the results of this test, if he recalls the details, as he described it at the time.

While I do not have the facilities necessary to engage in extensive test work of this kind, I maintain that a concerted effort by the carbon people and the lamp manufacturers in the direction outlined above would obviate the necessity for even considering the replacement of any D. C. arc now in use. Consideration of the appended article relative to the electron flow as applied to arc lamps sets forth my theory of the action of the arc.

Electronic Crater Formation

I have heard and read considerable comment on the crater formation of carbon arcs, a majority of which explanations are satisfactory. I do believe, however, that this action may be explained more thoroughly, and this I shall attempt to do in this article.

The crater of a carbon arc is due to the electron flow, and the electron flow is proportionate to the intensity of the volatilization and the induced voltage. The electron stream is directed at the core of the positive carbon because of the magnetic deflection of the surrounding atmosphere. To those who doubt the accuracy of this statement, I suggest that they try an arc deflection with a magnet. If retained, and the magnet be strong enough, it will blow out the arc, due to the forcing of the electrons in a wider radius. Also, many projectionists will recall the trouble occasioned with some lamphouses with a deflected arc resulting from the magnetic properties of the lamphousings.

Checking the electron flow, we find that the propagation is proportionate to the charge; in other words, the force of the electron is regulated by the magnetic field intensity X (times) the charge X the velocity, and this velocity is governed by the e. m. f. at the arc, the result being a disassociation of the electron from its atomic nucleus. Electrons in an arc do not under ordinary circumstances go straight from tip to tip but describe a curvature, and the radius of this curvature is equal to the mass X (times) velocity X the intensity of charge.

We see, then, where the deflection of arc electrons is really sustained by a certain curvature, because carbons placed vertical to each other do not as a rule get as incandescent as those placed somewhat out of line. This is due, I believe, to the fact that the electron is shot past its target or hits the carbon shell above the crater depression and thus causes small incandescent globules on the side of the carbon. If, shortly after this condition is noted, the carbon is carefully examined, there will be found on the shell small pits or holes—which condition, if permitted to spread, ultimately will result in a complete disintegration, or needling, of the carbon.

All projectionists have noticed in high intensity arcs that the radius of the arc stream from the negative to the positive (the displacement of the negative is to cause less light emission interference), is proportionate to the induced e. m. f. and to the magnetic deflection. This being so, a thermal control is easily utilized so that any change in the magnetic deflection, the result of carbon consumption, automatically brings relays into action and speeds up the feed.

Now, if the electron flow is projected with a certain velocity, and the angle of projection is in a certain direction, then

(*Continued on page* 32)

Thank You!

International Projectionist
580 Fifth Avenue
New York, N. Y.

Gentlemen: Enclosed is my subscription renewal for I. P. I am glad that your renewal notices arrive in ample time to prevent the loss of a single issue, which I feel could not be replaced for several times your subscription price.

I have benefitted more than words can explain by the monthly visit of I.P., and I have preserved every issue since Vol. 1, No. 1 as a valuable craft reference. Unquestionably you have many others on your list who feel the same way about I.P. as I do, but if there are any projectionists who have yet to be introduced to I.P., that is their loss.

When I wish you a long and useful life I am voicing the sentiments of hundreds of projectionists in this territory.

Sincerely yours,
CHARLES J. KEELER
Waco, Texas

HAIL BARROWS' CRAFT AID AT BOSTON BANQUET

SOCIAL gatherings are of little import to the craft and of little interest to this publication unless they concern the type of person who stands out as a shining example of craft leadership. That is why the dinner given recently in honor of Thad Barrows at the Hotel Lenox in Boston by the members of Boston Local Union 182 is noteworthy. Barrows, perpetual president of Local 182, is also President of the Projection Advisory Council and is well known to projectionists throughout America for his activities through many years in behalf of the craft.

The Barrows party was practically a "family" affair, with few invited guests outside the Local 182 membership being present. This was as the Local membership desired it, but among those who couldn't be kept out and crashed the gate were State and City officials, the irrepressible Paul Ries of National Carbon Co. and James J. Finn. James F. Burke, business representative of Local 182 acted as toastmaster. An added note is that the party was strictly "stag" in recognition of the sensibilities of the guests.

Handsome Token of Regard

After several hundred congratulatory wires addressed to Barrows had been opened, and many of them read, the Local 182 membership took the wraps off a wristwatch, beautifully engraved (gentleman's, of course) that was a tribute to the watchmaker's craft. The watch made the trip from Judge Day, of Boston, to Barrows on a path that was greased well by a five-minute ovation for Barrows, a ton of laudatory speeches and a masterly presentation by Judge Day.

Barrows acknowledged the gift, of course, but his act was materially weakened by the fact that the preceding speakers had stolen all his stuff and left him with nothing to say. They do say that the speech of acknowledgment carefully prepared by Barrows in advance of the party was stolen and parceled out to the various speakers who preceded him. At least, the Barrows speech of thanks lent considerable credence to this report.

Several of the speakers expressed the belief that the fine talents displayed and the splendid service rendered the Boston union by Barrows would shortly be recognized by the craft generally, with Barrows being called upon to devote his energies to a broader field.

Risking the displeasure of the many important civic officials present, the hotel management announced at 5 a.m. that if the party were to continue suitable arrangements could probably be made at a nearby armory where the party undoubtedly would not be molested for days at a time. Impartial observers on the scene of the festivities report that the party broke up in three hours flat from the time the hotel management made known its wishes.

This reporter makes only one additional comment to the effect that all of the nice things said about Barrows failed by a wide margin to do full justice to Barrows as a man, as a union leader and as a craftsman. Check—and double check.—JAMES J. FINN

General view of banquet hall during party tendered Thad Barrows by Boston L. U. 182. Inset: Presentation of watch, the gift of Union membership to Barrows, by Judge Day, distinguished Boston jurist

KAPLAN APPEAL CASES

Sam Kaplan, deposed president of Local 306, I.A. projectionist local in New York City, will figure in two important court actions within the next two weeks. Kaplan will go to the Appellate Division on appeal from the decision of Supreme Court Justice Miller which upheld his removal from office by the I.A. He will also appear in the appeal from his conviction in General Sessions Court of New York City on charges of coercion against members of L. U. 306.

Stench Bombing Victim Wins $25,000 Award

Charging that she was badly injured in a panic at the Farragut Theatre, Brooklyn, when a stench bomb was exploded, Mrs. Marie Ward, 69, has been awarded damages of $25,000 in the Supreme Court, Brooklyn, N. Y.

Far-Reaching Decision

Exhibitors throughout the country are very much interested in this decision, inasmuch as it is the first case wherein the theatre has been legally adjudged responsible for injuries resulting from factors which might be said to be beyond their control. The case was believed to hinge on that interpretation of the law which holds that an exhibitor is responsible for the safety of any admission-paying patron. The case is expected to go to the New York State Court of Appeals.

HIGH FIDELITY

Four houses of the Harris-Warren Circuit of Pittsburgh have arranged for the immediate installation of complete new Photophone High Fidelity sound equipments. They are the Warren, Warren, Ohio; the Harris, Jeanette, Pa.; the Family, East Liberty; and the Avenue, Pittsburgh.

UTILIZING THE LOCAL RADIO MAN IN EMERGENCIES

Aaron Nadell

IN emergencies, when the regular service man is not instantly available, or at any time in the case of theatres that do not contract for regular servicing, the local radio man may prove a source of valuable first aid. If he is expert in his line, he will possess spare parts, tools and technical knowledge that may be of the greatest help to the projectionist who is trying to keep his show going in the face of difficulties.

There are many ways in which the local radio repairman can help any projectionist, but before entering upon this it may be well to inquire into the basis upon which his assistance can be invited. Of course, he may be paid. But if he is called in during some emergency when the theatre is in desperate need of his apparatus or his services, or both, his charges may naturally be expected to run high. On the other hand, arrangements can be made in advance that will line up this useful assistance, and have it available when needed, at a very low cost, or even at no cost at all to the theatre.

These arrangements will involve the purchase of some parts from the local radio man instead of through some other source. The cost need be no higher than usual, and yet in return for this business the radio man may be willing to stand by with his meters and test gadgets and stock of spare parts in times of trouble.

Even in those cases where the theatre has contracted to buy all sound spares from the makers of its sound equipment, there will be surplus business that can be given to the local radio man without harm or additional expense. Outside the projection room every theatre uses fuses, and wire and batteries for the inter-communicating phone, and so on. Within the projection room, supply contracts made with the sound manufacturer often do not include "B" batteries, storage batteries, or similar sources of power supply. There are numerous other projection room supplies for which the radio man can perhaps secure an agency upon terms that will enable the theatre to purchase its usual equipment through him rather than through some other source, paying no more. As a reward for bestowing this business locally, the theatre may expect local help such as the radio man can give.

It is desired to emphasize the fact that the accompanying article by Mr. Nadell is purely a personal opinion and in no wise reflects the views of this publication. This publication has long regarded sound system servicing, as handled in the theatre field, as nothing more or less than a "racket"—and not a genteel "racket", either. This publication still adheres to its oft-expressed view that the logical sound system service man is the projectionist, and only the apathy of both exhibitors and projectionists has prevented the latter from assuming servicing operations—but we predict that projectionist servicing will not be long delayed.—Editor.

Lastly, the projectionist may find it advisable to arrange for a small weekly or monthly cash payment to the local radio dealer. This payment need be little greater than the savings that can be made in the spare parts inventory as a result of having the radio store's spare parts available to the projection room in case of need. In return for such payment the radio man may be willing to cooperate with the projectionist in the matter of periodic inspection of the equipment, lending his meters and other testing apparatus for that purpose.

If the initiative in any such arrangement comes from the projectionist rather than from the management, the details of the entire arrangement may remain completely in the projectionist's hands, and the activities of the radio man will fall into their logical place as subordinate to, and not independent of, the work and responsibility of the regular projection staff.

The possible assistance the radio man may render can be conveniently divided into four classifications, as follows:

1. Providing spare parts
2. Providing test equipment
3. Providing technical assistance
4. Providing "extras."

The nature of those "extras" will be considered later. They are not without value. Let us consider the other three headings in their order as shown.

Some theatres fortunately are located near a supply depot maintained by the manufacturer of their sound equipments, and in case of trouble can obtain spares of any kind in a very few minutes. Most theatres are not so lucky. Not a few theatres are so located that they cannot hope to obtain a spare before the end of the day's show. Such houses require a substantial investment in all spares that are likely to be needed, as a matter of precaution against emergency.

If the projectionist in one of these latter theatres checks up with his local radio dealer, he will find, perhaps, that more than half of the spares he carries in stock are always available on the shelves of the radio store across the street. Perhaps not the indentical equipment, but something close enough to it to serve as insurance against emergency. Arrangements that will enable the theatre to draw upon the radio stock, when necessary, are doubly helpful. They reduce the existing investment in projection room spares, but serve another function as well. Probably no theatre carries on hand *all* the spares it is ever likely to need. The expense would be too great. Most theatres carry those spares they are most likely to need, and trust to luck beyond that point.

Now, by checking up with what is in the radio store, and carrying in the projection room only those spares which the radio man is unwilling to stock, the theatre may with a smaller investment than previously have available to it *all* the parts it may ever need under any circum-

stances. At least, if not the same parts, substitutes for them that will be sufficiently satisfactory in time of trouble.

No theatre, within the experience of this writer, is fully equipped with all the test meters, etc., it could profitably use both for emergency and routine inspections. Meters are moderately expensive. But the radio man has most of them—for his own use, and as part of the stock he sells. A comparatively small investment will buy the theatre those the local radio man does not have. In return for its kindness in buying "B" batteries, etc., through him, or upon some similarly inexpensive arrangement, it should be possible for the projectionist to arrange for the use of all those meters when and as he needs them, at no cost to his office.

It is true that the radio man seldom has an output meter, or gain indicator, but he often possesses a rectifier-type a. c. voltmeter, and this makes a very satisfactory substitute, especially if it is of the multi-range type. Every radio man owns that very useful instrument, the ohm-meter, and nearly always d. c. volt- and ammeters as well. He commonly has useful tube testers, and nearly always a pair of high-resistance headphones.

The projectionist may compile a list of all the testing apparatus he would like to have in his projection room (if he had any hope of persuading the office to pay for it), and then visit the next-door radio shop. If repairs are made there, he can check the radio-man's equipment against his list, and will find nearly everything he wants, or at least something that will constitute a satisfactory substitute for everything he wants. All that remains is to conclude a satisfactory "deal" with the radio gentleman.

The radio man in most instances will not be familiar with theatre equipment. If he is to have anything to do with maintaining or repairing it, he will need the advice of the projectionist. But he is familiar with, and thoroughly accustomed to, running down trouble in vacuum tube amplifying circuits fundamentally no different from those in the projection room. He does that all day long; it's his work. The radio man and the projectionist working together on a broken theatre amplifier will find and fix the trouble, in most cases, before either of them alone could well get started.

If suitable arrangements are made in advance of trouble, and the radio man is given an advance opportunity to familiarize himself with the theatre equipment, the average emergency might well be repaired before the distant regular service engineer can get his car started. If there is no regular service engineer, the radio man's assistance, of course, is just so much more helpful.

The radio man can offer technical assistance of another kind. Out of his experience with different but very kindred apparatus, he should be able to offer valuable advice on any steps of improvement or modernization that may be under consideration, and to suggest still others that perhaps had not been thought of. Moreover, radio men are of necessity accustomed to doing things in the least expensive way, and suggestions from them will often be found not only quite practical but seldom to involve any great expense, such as theatres have long been accustomed to in the case of sound apparatus.

The radio man will in most cases be able to arrange temporary or permanent microphone set-ups for a stage show, amplifier set-ups for lobby ballyhoo,

Code for Colds

Keep your mouth shut; breathe through your nose.

Keep far away from persons who have colds.

Keep good hours; sleep eight of 'em every night.

Keep clean; take a bath every day.

Keep comfortable; dress according to the weather.

Keep fit through the balanced diet; include leafy vegetables, fruits and a salad; drink a quart of milk every day.

Keep the house well aired; windows in every room should be opened for a time each day, and all night in sleeping chambers.

Keep the body exercised; walking in the open is the best form of exercise. Walk briskly, your head erect, swing arms and breathe through your nose.

Keep away from patent medicines and nostrums; if you have a cold get to bed promptly and call the family doctor at once.

Keep the house and, if possible, your working place at a temperature of between 68 and 70 degrees.

KLANGFILM AND ZEISS IKON SETTLE PATENT TANGLE

An agreement between Klangfilm, G. m.b.H., and the Zeiss Ikon A.G., has been made whereby in future Zeiss Ikon must equip its projectors and sound reproducers for the German market exclusively with Klangfilm amplifiers and loud speakers, according to a report received from the U. S. Trade Commissioner at Berlin.

This agreement is considered as a most important factor in connection with the sound film apparatus market as well as with the sound film patent question in general. Before the agreement in question, cinema owners buying installations from Zeiss had to risk the creation of patent difficulties with Klangfilm. Therefore, these many disturbances and uncertainties stultified the apparatus market. The theatre owner suffered mostly but the entire film trade felt the effects of the situation also.

Canadian Theatre Conditions Show Improvement

The motion picture business has shown an increase of 15% in theatre attendance in the Toronto district in September and October, 1933, compared with the same months of 1932. For Toronto, Quebec and the Maritime provinces, the increase is said to have averaged 12%, due to greater trade and industrial activity, augmented payrolls and lessened unemployment, together with the more confident feeling of the public regarding the immediate future. It is accompanied by a 10% reduction in wages and salaries effected earlier in the year. As a result, the theatres are again showing profits, despite decreases in maximum admission prices. The first seven months' receipts, however, were lower than those of the same period of 1932.

A small concession in taxation was secured this year in Ontario, through elimination of the tax on admissions at 25 cents or below. The initial tax, of 2 cents, now applies to admissions between 25 and 35 cents. It then increases as admissions rise, with an average of 10% tax.

There are in Canada about 1,100 motion picture theatres, of which about 700 are equipped with sound reproducing apparatus. Ontario has 379 theatres, of which 205 are said to be in operation. Of these 150 are wired for sound. The reopenings in Ontario this fall do not exceed five theatres, and 20 will probably cover the total in the Dominion.

amplifier arrangements on trucks or in automobiles that may be used to advertise some special picture. The radio man can, generally, provide the theatre with assistance of that kind at comparatively low cost, and with entire satisfaction. Throwing such business his way will in itself be almost enough to compensate him for any efforts he may make in the projection room. Thus, in return for part of the advertising budget the theatre would spend in any case, and perhaps not to any greater advantage, the other services the radio man can render may be obtained at little, if any, cost.

The radio man can provide, temporarily or permanently, headphone attachments for hard-of-hearing patrons. He can rig up a radio arrangement to bring election returns, or fight returns, or world series returns, through the screen loud speakers. An effective and showmanlike novelty is a combination of such radio returns with an appropriate news-reel program,—the regular news-reel sound, of course, being cut off in favor of the radio. Where contractual obligations prevent the attachment of a radio to the sound system, the local radio man can rent or sell or lend the theatre his own amplifiers and loud speakers, which still will result in a satisfactory show. Again, some pictures leave room for other novelties in which the radio man can contribute by means of lobby displays, for example. This will be especially true of pictures based on radio broadcasting or on the wireless "S.O.S."

The possibilities of such "extra" cooperation between the theatre and the radio dealer automatically suggest ways in which the radio man's services in more routine matters can be retained with profit to himself but without any real additional expense to the theatre.

As previously stated, the projectionist protects his own interests if he will take the initiative in contacting a competent local radio shop and arranging for cooperation between the theatre and its proprietor. The spare parts always available in the radio store, and the meters and test equipment with which that store is provided offer ample pretext for asking the management if they wish to give the radio man a "break" out of the next ballyhoo budget. Since the radio man's efforts will probably be as effective in helping the box office as the window cards or other printing the same money will be spent for in any case, there will probably be no good reason why the management should not get along with a little less printing and devote the difference to a box office loud speaker, for example.

In the course of checking up with the

(*Continued on page* 32)

THE HISTORY OF THE ANIMATED FILM CARTOONS

(*Continued from page* 15)

drawing short bits of dramatic action in the form of plays, which he projected on a screen in the Reynaud Optical Theater (Fig. 2). His most notable picture was *Pauvre Pierrot*, drawn on a thirty-foot length of transparent medium which he termed "crystaloid." It should be noted that this was twelve years before either the first Eastman raw stock with celluloid base, or the Edison motion picture apparatus was demonstrated.

Space will permit mention only of the first few pioneers who struggled to make pictures move before photography was available to them. There were a great number of others, some of whom spent a lifetime at the work. One man continued grimly to peer into his devices until he sacrificed his eyesight. Another lost his sight, yet continued his work with the assistance of his wife. To such men as these our gratitude must be extended. The revaluation that followed the perfection of the screen cartoon should not be allowed to discredit those early movie devices; in perspective they may seem crude. But they were received in their day with all the acclaim accorded to Mickey Mouse today.

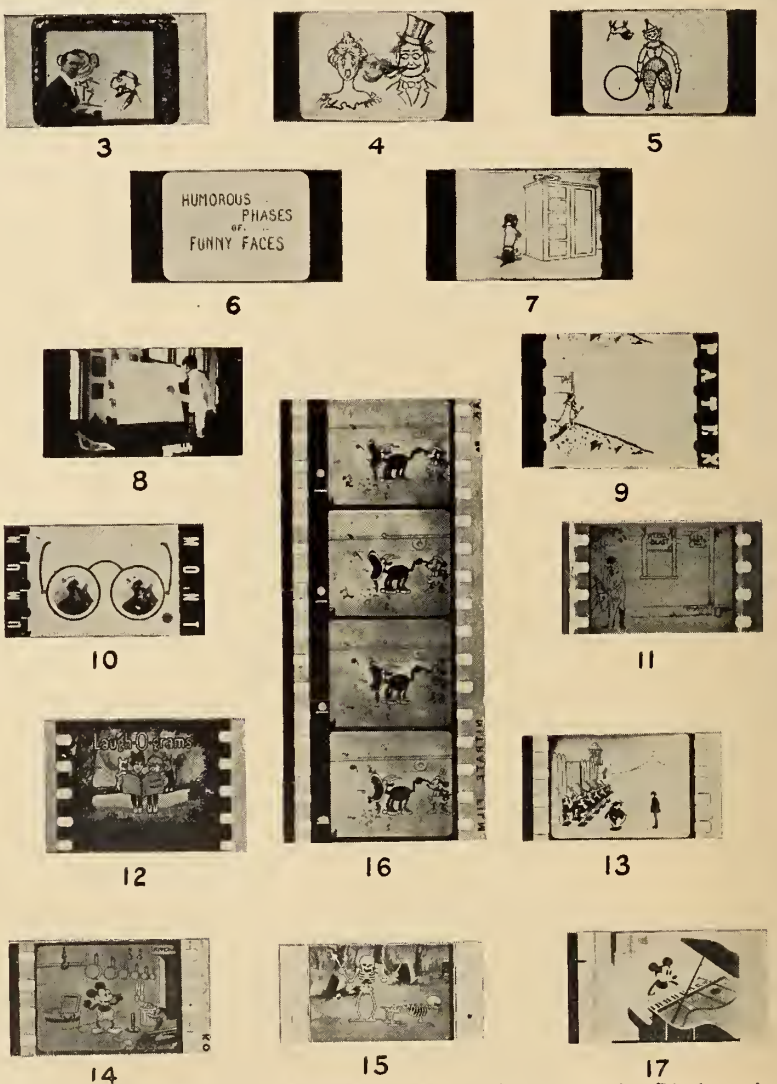
It was not until 1906 that the first cartoon was made on motion picture film. It was a picture made by J. Stuart Blackton, for Vitagraph, and was entitled *Humorous Phases of Funny Faces* (Figs. 3-6). A recent screening of this picture, with its 1906 copyright, and Vitagraph trademark, showed it to consist of such cartoon bits as a man rolling his eyes and blowing smoke at his sweetheart, a large-nosed Semite, a dog jumping over a hoop, and ended by showing Blackton doing a chalk-talk type of drawing, in which apparently the cartoon starts as one thing and ends as another. This first cartoon picture required about three thousand drawings and its running for an early-day audience, which was largely composed of the more solid citizenry, was a signal for great mirth. The man blowing the smoke at his sweetheart was the highlight of the picture. Since cartoon technic at that time permitted the girl to show her displeasure only by suitable eye movements, the picture had its elements of humor.

The McCay Cartoons

The next man to make animated pictures was Winsor McCay. The first was completed early in January, 1911, and was known as *Little Nemo*. It was photographed in one-reel length by Walter Arthur, directed by J. Stuart Blackton and released by Vitagraph as *Winsor McCay Makes His Cartoons Move*. It contained more than 4,000 drawings, each complete with a background and was considered a mammouth undertaking at that time, despite the fact that the present cartoon requires as many as 12,000 drawings, which are run for a screen time of only six minutes. McCay's second picture, *How a Mosquito Operates*, was made in December, 1911, in 600 feet and was sold to Carl Laemmle. The third, *Gertie, A Trained Dinosaur*, was sold to William Fox. These pictures were used also as a vaudeville act by McCay, who toured with them and explained their making and technic.

To McCay goes the credit of making the first serious attempt at a dramatic cartoon. *The Sinking of the Lusitania*, released on August 15, 1918, by Jewel Productions, was a cartoon of feature length. According to the *Motion Picture News*, of August 18, 1918, it was "made from 25,000 drawings on gelatin by the famous artist, Winsor McCay, requiring 22 months of work." The picture attracted attention at this time by virtue of its length and because it was a propaganda picture for the war. To date it has been the longest cartoon ever made.

John R. Bray, during the period 1914-16, was granted several patents on making animated cartoons. The first, filed January 9, 1914, and granted the same year as No. 811,165, described a method



FIGS. 3 TO 6. Copies from specimens of cartoon films made by Blackton in 1906 (FIG. 3, picture of Blackton doing a chalk talk in his 1906 cartoon). FIGS. 7 and 8, the first Bray cartoon, *The Artist's Dream*, by J. R. Bray. FIG. 9, Pathe newsreel cartoon of about 1912 (note the Patents Company stencil on the edge of the film). FIG. 10, Gaumont cartoon of about 1912. FIG. 11, Packer cartoon of 1916. FIG. 12, the first Disney series made in St. Louis, 1921. FIG. 13, one of the *Alice Cartoons* made by Disney, 1923; a combination of real-life characters and cartoon. FIG. 14, first Mickey Mouse, *Steamboat Willie*. FIG. 15, first Silly Symphony, *Skeleton Dance*. FIG. 16 first method of synchronizing sound and picture; originated by Disney. The bouncing ball kept time for the musicians when scoring. FIG. 17, recent Mickey Mouse, showing sound track

of registration so as to hold each picture in correct relation to every other for photographing. The most important claim in this patent, however, related to the use of a translucent background over the character drawing. It will be noted that this is a departure from the tedious process of drawing each cartoon complete with a background and character, as was heretofore done. With this patent, Bray introduced the idea of making one background serve for all the action occurring in that scene (Fig. 7). He printed his background from a zinc plate on thin translucent sheets of paper, which he laid over the character drawing for photographing. This system did not permit good quality and was used only for the first few pictures, after which he adopted a system similar to the Earl Hurd method. Bray further eliminated unnecessary drawing by introducing the "stationary" drawing, which comprises the use of separate sheets of celluloid when a part of the character is motionless while other parts are moving. One drawing is made for the motionless part, while the action of only the moving part of the character is drawn out.

First Bray Cartoon

Cartoon history may be said to date from the announcement, on June 12, 1913, of the first Bray cartoon, *The Artist's Dream* (Fig. 8). This, while not the first of the animated cartoons, was the forerunner of the cartoon vogue. Previous to that, cartoons were largely considered a novelty, or photographic trick. They had been used at the end of newsreels, or vaudeville acts, and were shown more or less apologetically. Now, audiences seeing *The Artist's Dream* were left in a mood bordering on the hysterical, from laughter, and demanded more cartoons. The central character of this cartoon was a dachshund, with the long "wheel base" and the short legs. This dog, which resembles so much an animated sausage, experienced difficulties with a flea, which interrupted the dog in obtaining his sausages for dinner.

Another Bray cartoon, *Col. Heeza Liar*, which was the "Mickey Mouse" of that day, was by far the most popular of the early cartoons. The first of the series, *Col. Heeza Liar in Africa*, was released by Pathe in December, 1913. They were discontinued after about five years, and again resumed in 1922 as an *Out of the Inkwell* combination. Walt Lantz, who draws the Universal *Oswald*, drew the later series, which consisted of a combination of the conventional motion picture into which was introduced *Col. Heeza Liar*.

Bray has the distinction of having made a hand-colored cartoon in 1917; it attracted much attention, but was impracticable because of the high cost of coloring each frame.

Birth of Modern Technic

Earl Hurd introduced the modern technic of making cartoons. On December 19, 1914, he filed an application for a patent which, on June 15, 1915, was granted as No. 878,091. In this patent, he claimed the use of a transparent medium bearing the moving parts of the cartoon over an opaque background. Hurd was the first to use celluloid for his action drawings, which he laid over a background as is done today. It will be remembered that Bray, in his first efforts, drew his backgrounds on a transluscent medium, which he laid over his characters for photographing, and wherever the background interfered or covered the character, that part of the background was removed. Earl Hurd's first cartoons were the *Bobby Bump* series. Bray and Hurd combined their patents and formed the Bray-Hurd Company early in 1917.

Another early worker was Sidney Smith, who made *Old Doc Yak* for the Selig Polyscope Company. The first of this series was released on July 8, 1913. Wallace Carlson, who made *Dreamy Dubb*, and later the *Caminated News* which was an *Out of the Inkwell* combination, was prominent at that time. Paul Terry drew *Farmer Al Falfa*. Leslie Fenton drew the *Hodge Podge* series which were released at the end of the Pathe newsreels.

Max Fleischer was the first to make the *Out of the Inkwell* type of drawing. This is a photographed picture to which is added a cartoon character by photographing a series of opaque cartoons drawn on celluloid placed over previously photographed conventional motion pictures. Fleischer's first series was *Koko, the Clown*, released by Paramount in 1917.

During this period Leon Searle made what was known as "cutouts." They were jointed characters cut out of paper and animated across a background. Their animation was rather jerky, as were the marionettes made about the same time by Tony Sarg. The Sarg marionettes were figures illuminated from the rear, thus producing a silhouette effect.

Raoul Barre, who began making the Edison cartoons, introduced the "slash" system, whereby the motionless parts of the characters were drawn once, and the animated parts of the characters torn away. These moving parts were then drawn on another sheet so as to

coincide with the stationary parts. The two were then photographed simultaneously, one over the other, thus saving unnecessary drawing. Barre also originated the use of registering pegs and punch holes in the drawings for holding them in place during the photographing.

Bill Nolan, working with Barre, was the first to use a panorama background. The panorama, with the characters moving past the background, was an innovation and made a decided improvement in the action. That was in 1916.

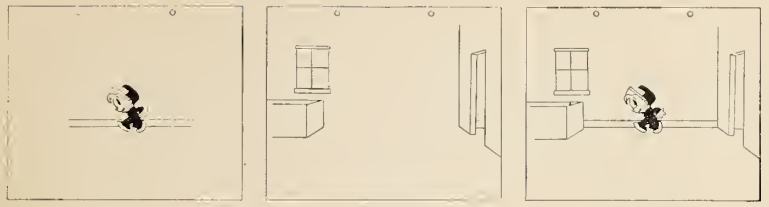
Most of the cartoons shown on the screen in 1917 were greatly inferior to those of today. They were crude and the characters imperfectly synchronized. They would walk either too fast or not fast enough; the leg movements seemed to create the illusion that the feet were being dragged somewhat in the manner of a skater's sliding over the ice. Another characteristic was the "bubble" type of title. This title was similar to the present press cartoon title, in which the wording appears in a balloon with a line leading down to the character. When the title appeared on the screen, the character would come to a pause, face the audience and "yap" or rapidly open and close its mouth to represent talking. This, of course, greatly interfered with the continuity of the story.

The Hearst Cartoons

Into this period entered the International Feature Syndicate, formed by William R. Hearst. He placed Gregory La Cava in charge, who immediately set about improving the cartoons. He increased the number of drawings from the 2,000 of the average cartoon of the time to 3,500, resulting in smoother animation. Further, he changed the animation of the characters from the stiff, angular movements of the legs and arms to a smooth "rubbery" animation such as is used at present. La Cava also discontinued the "bubble" title for the conventional title of the silent days.

Beginning in 1917, the International Syndicate released such cartoons in series as *Jerry on the Job* (Fig. 18), drawn by Walt Lantz; *Katzenjammer Kids*, by John Foster; *Tad's Indoor Sports*, drawn by Bill Nolan and released at the end of the International Newsreel. *Happy Hooligan*, drawn by Jack King; *Bringing Up Father*, by Bert Green; *Krazy Kat* (Fig. 19), drawn also by Bill Nolan and Leon Searle, and the best of the Internationals, *Silk Hat Harry*, were the principal cartoons released at this time by that company. This last-named was drawn by Walt Lantz and La Cava, and was first released in 1918.

The first International cartoons were made somewhat after the principle of the first Bray cartoons, in which the background was drawn on a translucent medium and the characters on an opaque sheet. The background was then laid on top of the character draw-



(a) (b) (c)

FIG. 18. *"Jerry on the Job"*, animated by Walt Lantz in 1917: the drawing (*a*) is placed beneath the drawing made on celluloid (*b*), and the two photographed together, producing the effect (*c*).

ings. Where any part of the background interfered with the character animation, that part of the background was drawn on the same sheet with the character. This system was discontinued after the first few cartoons in favor of the now conventional "celluloid over the background" method.

Other famous cartoons during the 1917-20 period were the *Mutt and Jeff* series made by Bud Fisher. The Kay Company released the *Terry Cartoon Burlesque*, and Sterling Pictures the *Zippy* series.

Skipping over the years to the sound era, we come to Walt Disney and his *Mickey Mouse* series, which were the first cartoons with sound. *Steamboat Willie* (Fig. 14), was the first of this series and had its premiere on September 19, 1928, at the Colony Theatre in New York. An earlier Mickey Mouse had been made but it was released later as *Plane Crazy*. Mickey Mouse is probably the most popular of any screen character, whether in real life or cartoon. He is certainly the acme of all that the screen has to offer as entertainment.

Disney started cartoon making in St. Louis, in 1921, when he made the Laugh-O-Gram (Fig. 12) series. In October, 1923, he and his brother, Roy, went to Hollywood and produced the *Alice Cartoons* (Fig. 13), which were a combination of real life characters and cartoons.

Disney's first Silly Symphony, *The Skeleton Dance* (Fig. 15), was released at the Carthay Circle, in Los Angeles, in July, 1929. It was later shown at the Roxy in New York. It was the first cartoon picture to be rebooked for a second showing at the Roxy.

The method of synchronizing the first Mickey Mouse was by the "bouncing ball" method (Fig. 16), in which a ball was made to bounce in time with the music as a guide for the musicians, who watched the picture and the ball as they appeared together on the screen. This ball was photographed along the edge of the film, which space was later occupied by the sound track in the release print. Disney next used a wavy line, and finally adopted an aural method. The last method, employing headphones, is still in use. Disney controls many of the sound cartoon synchronization patents.

The first Silly Symphony in color was *Flowers and Trees*, first shown at Grauman's Chinese Theatre, Hollywood, on July 15, 1932. This was the first cartoon to employ the Technicolor Cartoon Process, a three-color imbibition process. Judging from today's standards it seems that it will be impossible to improve upon the beauty of these Disney cartoons colored by this process. Many will remember the cartoon sequence that served as an introduction to the Universal picture, *King of Jazz*, released on March 30, 1930. It was colored by the Technicolor two-color process and was the first cartoon on record to be mechanically colored.

Another cartoon to follow this was Ted Eshbaugh's *Goofy Goat*, made by Multicolor and released at Loew's State Theatre, Los Angeles, on March 2, 1932. Many will credit this cartoon with being the first in color, since it was the first complete cartoon story done in color, whereas the earlier Lantz cartoon was only an introduction for a real-life picture.

Current Cartoons

The current cartoon characters besides those named are *Oswald* and *Pootch-the-Pup*, drawn by Walt Lantz and Bill Nolan for Universal; *Krazy Kat* and *Scrappy* made by the Mintz Studio; *Looney Tunes* and *Merrie Melodies* made by Leon Schlesinger; *Flip-the-Frog*, by U. B. Iwerks for M. G. M. release; *Aesop's Fables* and *Tom and Jerry* by the Van Buren Corporation; *Betty Boop* by Max Fleischer; *Bosko* by Harman and Ising, released by Warners as a "Looney Tune"; *Magazine of the Screen* by Bray; and *Terry Tunes* by Paul Terry. *The Wizard of Oz* will shortly be released as a series in Technicolor.

Such is the history of cartoons. It is interesting to observe their popularity today and then to recall their reception back in 1911-14, when they were always coupled with real-life characters in order to give a reason for their existence. *The Artist's Dream* had, as an introduction an artist who drew a picture and fell asleep; then the drawing came to life. The McCay cartoon had, as an introduction, a bet that he could not draw motion. He was pictured making a bet, and then the cartoon followed. Pathe, more or less hesitantly, ran a few short, terse bits of action in cartoons on the ends of their newsreels during 1911.

Today, cartoons are a source of wonder. Those making animated cartoons lift out and re-shape human experiences in their more lovable form. They instill into the screen a gaiety and glow that depicts human traits in their more desirable form. They re-create again lost childhood. It is a form of entertainment that the screen must never lose.

RCA PHOTOPHONE NOTES

The Photophone Division of the RCA Victor Company has announced the appointment of Elmer Grace to the San Francisco territory, replacing M. F. Lowry; and the appointment of J. W. Sims to the North Carolina and South Carolina territory, replacing C. A. Mathews. Mr. Sims' headquarters will be in Charlotte, N. C.

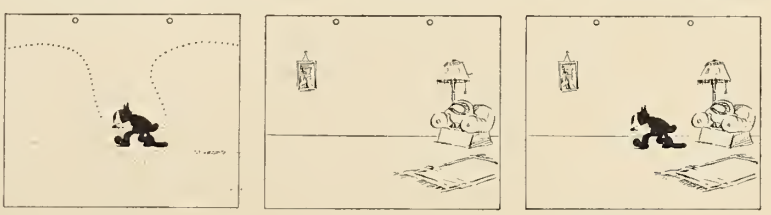
Photophone High Fidelity sound reproducing equipment has been installed in the RKO Screening Room at the Cincinnati offices of the RKO Distributing Corporation.

With the recent installation of RCA Victor High Fidelity sound in the Indiana Theatre at Bloomingdale, the H. P. Vonderschmitt Theatre Enterprises became 100% Photophone equipped.

BRITISH ISLES STATISTICS

A substantial increase in the number of wired houses in the British Isles is shown in the latest theatre analysis made by T. P. Drew, Western Electric's Sales Chief abroad. The analysis shows 4,414 theatres including 258 silent houses. The total number of W. E. installations is 1,666.

Divided into countries the theatre analysis is as follows: England: 3,385 sound, 128 silent; Scotland: 494 sound, 72 silent; Wales: 326 sound, 27 silent; and Ireland: 209 sound, 31 silent.



(a) (b) (c)

FIG. 19. *Felix the Cat*, animated by Wm. Nolan for International in 1917 showing the "slash" system used by Raoul Barre in the early Edison cartoons; the drawing of the cat (*a*) is cut as indicated by the dots and is superimposed on the background drawing (*b*). The photograph of the combination is shown at (*c*).

UTILIZING THE RADIO MAN IN EMERGENCIES

(*Continued from page* 27)

radio man in the matter of spare parts he can furnish if needed, there is every reason why he should be invited to look at the theatre's sound equipment. If he has any reasonable hesitation about lending his valuable test meters for work on that equipment—and no doubt he will—there is no reason why he should not be invited to assist in the work of inspection and emergency repair, and use his precious meters himself. In some cases a small weekly or monthly payment to the radio man may be necessary, but in most instances, perhaps, the opportunity to do "extra" work for the theatre with his loud speakers and amplifiers (at the usual charge), coupled with the inside opportunity to sell the theatre such parts as it has not definitely arranged to buy elsewhere, will find the radio man more than pleased to donate his personal services.

But however the details may vary, in general it should be possible to obtain the necessary spare parts of the radio man, his valuable meters, and his personal services in assistance to the projectionist, for no other return than preference in business the theatre has to give to someone in any case.

There is still another way in which the theatre can pay the radio man without any cost to itself, and that is by offering him its lobby for the display of his radio sets and other products.

Most of these methods of inexpensive compensation do, however, from the point of view of the projectionist, possess the disadvantage of injecting the radio man into the picture as the direct auxiliary of the manager, rather than, as should be the case, as an assistant to the projectionist, under and within the limits of his responsibility. Therefore, if any such arrangements are to be made the projectionist must take the initiative in making them, and not wait until the radio man or the manager do it for him.

GREATER EFFICIENCY WITH PRESENT D. C. ARCS

(*Continued from page* 23)

the angle of deflection will be the angle of the equivalent voltage and therefore the force of the electronic bombardment will depend upon:

permeability X intensity X current

The outer shell of a carbon is more or less of a support, and while it does volatilize as a result of the stray electronic impacts and surface radiation, it is practically the conducting path for the lines of force, with the surface area being in proportion to the number of lines of force necessary to carry the current and voltage.

Distributing the Burden

As the carbon shells are the conductors, and the electronic emission is the bombarding element that drives the chemicalized core to a white incandescence, the heat radiating and volatilization factors of the carbon shell also bear a certain portion of the burden. In

sharing this burden, however, the carbon shell, being the conducting element of the carbon, also creates the magnetic field by reason of the emanation of lines of force which surround all conductors in an active state, and it is this magnetic field that keeps the electron flow in its predetermined path. This path, as all projectionists know, is the path between the negative carbon tip and the core of the positive carbon.

It is evident, therefore, that due to the electronic bombardment and the slower volatilization of the shell, a saucer-shaped crater is the product of the faster volatilization of the core which results from this bombardment.

WHILE I am at the task of setting down the foregoing few words for my good friend, Mr. James J. Finn, I should like to include a few words on a topic which I consider is becoming increasingly important as various changes occur in the projection field. This topic has to do with projectionist training and subsequent licensing.

Projectionists at Fault

Standards have been set up in this industry for the production and distribution of motion pictures, for the manufacture of essential equipment, the control of raw stock and a multitude of other activities. Yet there have never been any standards for the training of projectionists—and as for the licensing situation, there can be no doubt that projectionist licensing at its best is a disgrace, particularly to the projectionist craft and in general to the industry. The present method of licensing is at the root of practically all the trouble now being experienced by organized groups of projectionists.

For this situation the projectionist

organizations themselves are to blame, because not a single step looking toward improvement in this important respect has originated with responsible projection groups. Competent and experienced projectionists decry the entrance into the field of men who are almost wholly unfitted for projection work, the result of which is to make available a supply of projectionists which far exceeds the demand. Still, the very same men who complain bitterly against these conditions do nothing to improve matters, and they are particularly complacent and docile in the matter of letting their own organizations continue to operate in an outmoded fashion.

Although I am an organization man myself, I for one do not believe that the mere fact that an organization exists is sufficient reason for expecting that all work will naturally gravitate toward organization headquarters. A course of rigorous *preliminary* training should be an integral part of every union charter, and the international office of a given craft should insist upon strict observance of all such laws. Many unions include in their constitutions provision for at least one educational meeting each month—and then proceed to forget all about it.

Present practice is for a man to be admitted to an organization (sometimes after an examination that is a joke), after which the new member is permitted to learn his trade at the expense of the theatre, the public and (very often with serious results), at the expense of the union itself.

Inadequate Examinations

It is useless to depend upon the abilities of those men who are delegated by local or state authorities to conduct exinations of projectionists, because if the requirements for such examinations are a bit too stiff (and they seldom are), the official in charge usually "can be reached". Furthermore, most of these examinations concern themselves altogether too much with electricity. Granted that electricity is an important feature of projection work; yet I hold that a comprehensive knowledge of electricity by no means qualifies a man for projection work. On the contrary, very often a man who makes no pretensions to an extensive knowledge of electricity makes a fine projectionist. Projectionists are not permitted to pull wires, change circuits, etc., because of the electrical licensing laws in force in most states, yet the common form of examination concerns itself almost wholly with electricity.

Lighting, care and handling of film, lenses, projector mechanisms, correct tensions, lamphouses, mechanics—these are the subjects which should be the concern of a projectionist, rather than questions relating to the proper size wire necessary for a circuit run.

Fear for the Future

Neglect of proper first training and subsequent review work to keep a member posted may well in the long run mean the undoing of projectionist organizations. If a man may step in from a coal truck, or a trolley car, or a delivery wagon on the street and go through the motions of that projectionist who has had no adequate training and has taken advantage of lax licensing laws, then the reason for being of our present organizations is not quite clear to me. If it were an indisputable fact that the organization man was ever so much better as a projectionist than any man or group of men outside the organization, I believe that most of the unsettled conditions prevailing in the field today could be eliminated.

This matter of proper first training, subsequent review work and a standard licensing law should have the early attention of those organizations which are interested in bettering conditions within the craft. Among these groups are the Projection Advisory Council, the S. M. P.E., the American Projection Society—and last, but by no means least, that organization which may be said to have the biggest stake in the matter, the International Alliance.

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Edited by James J. Finn

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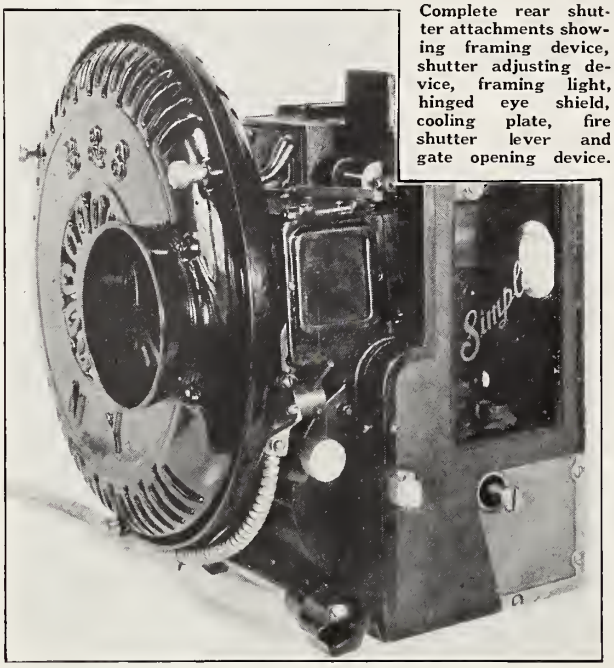

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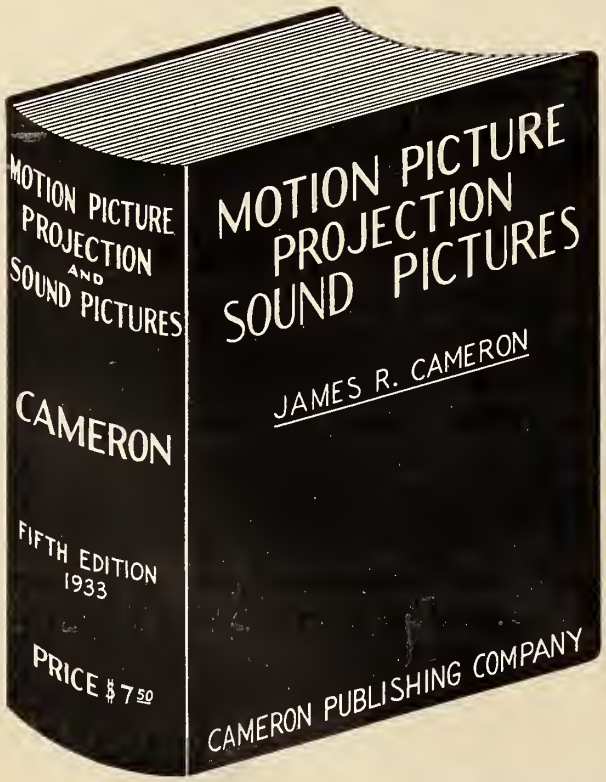

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Edited by James J. Finn

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MONTHLY CHAT

TO those who piled up hundreds of letters in this office in praise of our stand relative to the current interpretation anent the overage-in-hours feature of the motion picture code, our thanks. Nothing contributes as much to the success of any battle as the knowledge that "the crowd" is with you.

Our activities may not result in a modification of this vicious feature of the code, but at least it will be relatively simple to place the blame for the condition *precisely* where it belongs.

OUR friends the lamp manufacturers, silent for lo, these many months, have burst into song in praise of the new A.C. carbon lamp, as is attested to in succeeding pages. Considerable interest has been whipped up in the projection field about these new A.C. lamps, and it should be added that there exists not a little difference of opinion as to the benefits to be derived from this development. Our time-tried and proven friend, Old Doc Time, will write the final answer to this question.

BEFORE we publish another issue a group of New York City theatre owners—some 102 in number who have banded into an association—will have begun suit against ERPI on the score of excessive charges during the past five years and in opposition to compulsory servicing. If properly handled, this suit should go far toward clearing up this sound system servicing muddle.

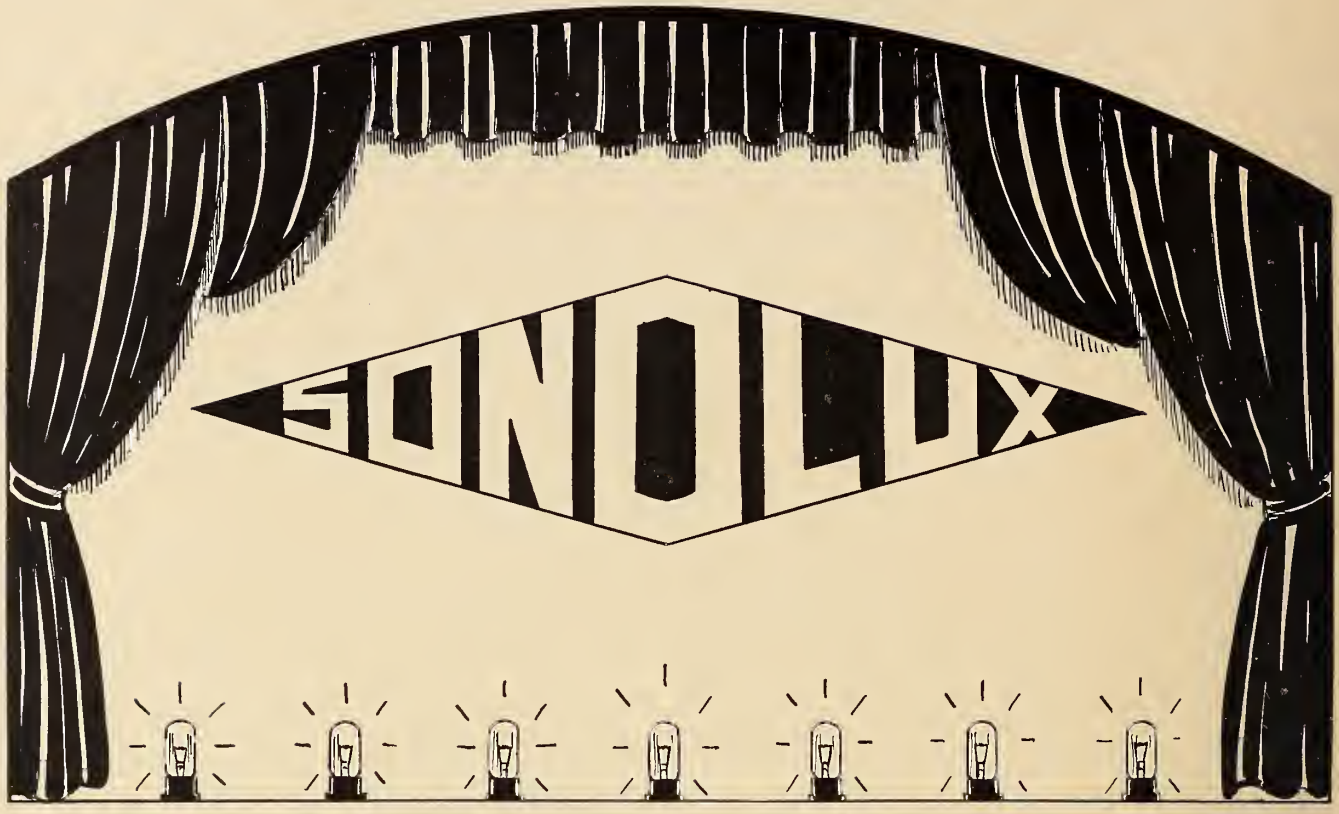
Meanwhile, from RCA-Victor Co., which does not impose compulsory servicing upon its customers, come reports which indicate that its Photophone system is playing a major role in breaking down the long-established numerical line-up of major sound companies. Congratulations, Mr. RCA-Victor, for an intelligent sales and servicing policy.

THE distinguished Mr. F. H. Richardson hints that the code is not to his liking, and suggests that it was improperly handled by the labor representatives present. Well, "Rich" might have been present himself and thus availed himself of a first-hand slant on the code run-around.

NOW that the rounds have been made of practically all the available "brass hats" and stuffed shirts in America for appointment to the Code Authority, we should like to come forward and nominate for appointment none other than Dr. Alfred N. Goldsmith. The fact that Dr. Goldsmith is president of the S.M.P.E. and one of the outstanding engineers in this or any other country (we just couldn't resist this opportunity to smack the engineers) shouldn't be taken to mean that he doesn't know more about the various angles of the picture industry—production, acting, writing, distribution and exhibition AND LABOR—than the entire personnel of the present Authority.

He does.

Holiday Greetings From



SONOLUX is deeply appreciative of the fine support of projectionists and others which enabled it to reach the close of 1933 with double the volume of business in the sound projection field that it enjoyed at the end of 1932. And, orders now in hand indicate that 1934 will see a further extension of the already widespread use of SONOLUX Exciters in the theatre field.

Naturally, SONOLUX quality, no less than its fair prices, went far in holding old friends and in making new ones—but there is one other SONOLUX policy which undoubtedly played a major part in improving sales volume during the past year, and that the unvarying SONOLUX policy of fair dealing.

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To all those in the theatre field who contributed to this remarkable SONOLUX record in 1933—and particularly to the projectionist craft, which overwhelmingly approved of the SONOLUX product—we extend our sincere thanks and our best wishes for a Happy and Prosperous 1934.

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INTERNATIONAL PROJECTIONIST

VOLUME VI NUMBER 3

DECEMBER 1933

THE ELEMENTS OF AUDIO AMPLIFICATION

Charles Felstead

THE functioning of the thermionic vacuum tubes and their operation in audio-frequency amplifiers is more or less of a mystery to most persons. Yet it need not be, for if the fundamental principles underlying the action of vacuum tubes are once mastered, the subject is one that is not difficult to comprehend.

Fortunately for the purposes of this treatise, all of the tubes used in theatre sound projection systems are of the simple three-electrode type; although those that are employed as rectifiers function simply as two-electrode tubes. Some of the new tubes used for radio reception have as many as seven electrodes, such as the 6A7 pentagrid converter with its filament, cathode, four grids, and plate.

Even though he might never have occasion to make repairs on the audio-frequency amplifiers in the sound projection equipment, it is well for the projectionist to know the principles on which that portion of the apparatus functions. Since a stage of amplification is composed of little more than a vacuum tube and its associated input and output coupling devices, a thorough understanding of the theory of the vacuum tube makes it easy to comprehend the operation of an amplifier.

To make the presentation of the data as clear as possible, the work has been divided into three sections. This first part deals with the construction, and the theory of the functioning, of elementary two-electrode vacuum tubes and their use as rectifiers; while the second and third parts discuss the functioning of three-electrode tubes and their operation in audio-frequency amplifiers.

The Diode Tube

As early as 1884, Thomas A. Edison made the discovery that hot bodies *in vacuo* had the property of permitting the passage of electrons to a cold electrode in the same vessel. This property was called the "Edison effect", and was first detected in incandescent lamps. Later experiments resulted in the development of the two-electrode vacuum tube, or diode, by Fleming in 1896.

The original diode was known as the "Fleming Valve", and consisted of a hot filament surrounded by a cold metal plate within an evacuated glass bulb. The filament and glass bulb used resembled the filament and bulb of a large automobile headlight lamp. Before discussing the functioning of this device, it will be necessary to examine the action of a heated filament *in vacuo*.

The metal that forms the filament of the tube is composed of atoms which are constantly moving in all directions within the metal. There are some electrons that have escaped from atoms that are likewise moving within the metal from one atom to another, and their average velocity is greater than that of the atoms. If the metal of the filament is heated, the speed at which the atoms move increases with the increase of temperature.

The heating of the filament is accomplished by passing an electric current through it, in the same manner that the filament of an electric light is heated. If this heating of the metal were done in air, the emitted electrons would fall back to the filament, and oxidation of the surface would occur; so in the fol-

lowing discussion it will be assumed that the heated filament is within a glass bulb that has been exhausted to a high vacuum.

Evaporation of Electrons

The boiling of water will be used as an analogy to represent the action of a heated filament. If water is placed in an open pan and heated over a fire, the atoms that form the water will be accelerated in their motions within the water until their velocity becomes so great that some of them will break through the surface tension of the water and escape in the form of steam. This we call evaporation. The metal filament when heated acts in exactly the same manner, for the atoms of the metal tend to separate from each other at high temperatures. Some of the atoms (the number being proportional to the temperature of the metal), attain such a high velocity that they break through the surface tension of the metal and are released, just as the atoms of water are released.

In other words, the metal evaporates; but because its surface tension is higher than that of water, a far higher temperature must be employed to cause the evaporation. However, due to their higher velocity because of their smaller mass, the free electrons of the filament escape from the metal at a lower temperature than do the atoms. The swarm of electrons about the heated filament resemble the atmosphere surrounding the earth: the farther from the surface of the earth, the thinner the atmosphere; likewise, the farther from the surface of the heated filament the less dense the swarm of emitted electrons.

The condition of the surface of the metal filament has a tremendous effect on the ease with which electrons evaporate from it. Certain oxides coated over the surface of the metal will greatly increase the electron emission; while coatings of certain other oxides and substances, or a trace of water vapor, will "poison" the metallic surface, which means that they will practically prevent the evaporation of electrons.

The original filaments used in vacuum tubes were of pure tungsten. This metal is dazzingly bright in operation, although it must be remembered that the light radiated is incidental to the heating process. But when it was discovered that a coating of certain metallic oxides on a metal foundation would provide the same electron emission with approximately one-tenth the power required to heat a pure tungsten filament, the oxide-coated filament came into wide use. The employment of a lower filament temperature provides the oxide-coated filament with about ten times the life of a tungsten filament.

A very thin twisted ribbon of platinum-nickel alloy is used as the support for the oxide coating. Strontium and barium oxides are mixed with paraffin, applied to the filament, and baked on. Another layer is then applied and baked, and the process repeated until about fifteen layers of oxide have been deposited on the metal foundation. The oxide coating makes the metal black; but the filament burns at a dull red.

The Thoriated Filament

Most of the tubes used in radio receiving sets have thoriated filaments. This type of filament is made of tungsten that has had a very small amount of thorium oxide and carbon dissolved in it. If the temperature of the filament is raised to the correct value, some of the thorium oxide is reduced to metallic thorium, which gradually works its way to the surface of the filament, forming there a layer just one atom deep.

It is probable that the tungsten serves only to heat the thorium layer and renew it as it disintegrates, for the electron emission is from the one-atom deep layer of metallic thorium. As more thorium atoms come up under the thorium atoms on the surface, those surface atoms at once evaporate; so the metallic-thorium layer is never more than one atom deep. The filament glows with a yellow color when heated.

If the filament temperature be too high, the metallic thorium comes to the surface in great abundance; but it evaporates immediately. Complete depletion of the thorium layer is likely to be the result, leaving only the tungsten foundation, which will not evaporate at the temperature employed for the thoriated filament. This is termed the *deactivation* of the filament; but by an electrical process of *reactivation*, which will not be described here, the filament can be restored to normal operation. Now that we understand the functioning of the filament, we will see what action takes place when a cold metal plate is introduced in the evacuated glass bulb containing the hot filament.

The metal plate surrounds the filament and is close to it. It is connected to the positive terminal of a plate battery (usually of ninety volts potential or more), which gives it a positive electric charge. The negative side of the plate battery is connected to the filament, as shown in Figure 1. A rheostat is provided for regulating the filament current of the tube, and a sensitive milliameter (a milliampere equals one-thousandth of an ampere), in the plate circuit permits measurements of the plate current.

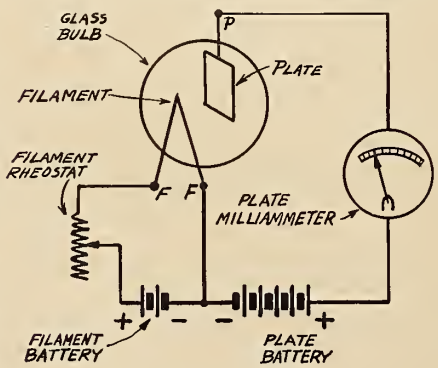


FIGURE 1

Two-electrode vacuum tube circuit

The electrons thrown off by the evaporation of the hot filament are negative, and so they are attracted by the positive plate and shoot through the vacuum to it (for like forces repel and unlike forces attract). But in normal operation of the tube not all of the electrons that leave the surface of the filament reach the plate. There are two reasons why this is so. In the first place, the loss of a negative charge by the filament when an electron escapes leaves the filament slightly positive, and it attracts the electron back to it. The attraction of the filament is much weaker than the attraction of the plate; but the electron is so close to the filament that, unless the plate voltage is quite high or the velocity with which the electron left the filament was great enough to carry it into the field of the plate, it will be drawn back to the filament.

Space Charge Effect

The second reason why all the electrons emitted by the filament do not reach the plate is due to the swarm of electrons which have left the filament and have not yet returned to it or been drawn to the plate. These electrons form a negatively-charged cloud about the filament, which tends to repel electrons that are just leaving the filament. This cloud of electrons between the filament and plate constitutes what is termed the *space charge*. Electrons thrown off by the filament that have not sufficient initial velocity to penetrate the negative cloud of electrons are driven by the repulsion of the space charge back to the filament.

By raising the plate voltage, a value will be reached at which all of the emitted electrons will be drawn to the plate and none of them will return to the heated filament. When that condition exists, the attraction of the plate is greater than the combination of the repulsive force exerted by the space charge and the weak attraction of the filament.

The value of the current flowing in the plate circuit (which may be read by the plate milliameter of Figure 1) when all of the electrons emitted by the filament are being drawn to the plate is termed the *saturation current* of the tube; and no further increase in plate voltage will avail to increase the plate

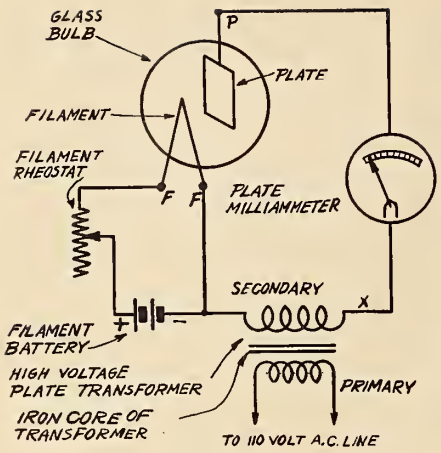


FIGURE 2

Basic half-wave rectifier circuit

current above that value. However, if the filament current is increased, more electrons will be emitted by the filament and a higher plate voltage will be required to reach the saturation current point.

An electric current is composed of electrons in motion. The flow of electrons is from the filament to the plate—*from a negative to a positive terminal.* That is contrary to the popular but incorrect conception that electricity flows from a positive to a negative terminal. That discrepancy is explained by the fact that early experimenters in electricity had no way of determining current flow, thus for convenience they assumed that the current flow was from positive to negative. We now attempt to reconcile those two contradictory ideas by saying that the electron flow is from negative to positive, and the current flow is from positive to negative; but in these articles we will consider that current flows from negative to positive—that is, from filament to plate.

Vacuum-Tube Rectifier

Current will flow only one way in the plate circuit of a vacuum tube, which is an unidirectional conducting device; so if an alternating current source is connected to the tube in place of the plate battery, current will flow from the filament to the plate only during the time when the plate is at a positive potential with respect to the filament. Incidentally, a 60-cycle alternating current, such as used for house lighting, reverses its polarity sixty times a second. That is, either terminal of the A.C. source is alternately positive and negative sixty times a second, and the two terminals are always of unlike polarity. One complete reversal of polarity represents one cycle, or one wave.

Referring to Figure 2, it will be seen that when terminal *X* of the A.C. line is negative, the pate of the tube is negative, so no current will flow within the tube because the plate, not being positive, will not attract electrons from the filament. But on the half of the cycle when terminal *X* is positive, the plate of the tube is positive and the tube functions normally. The rectified output is attained from the two leads so marked.

By substituting a low-voltage (step-down), transformer for the filament battery and a high-voltage (step-up), transformer for the plate battery, both operating from the 110-volt A.C. line, the standard half-wave rectifier circuit shown in Figure 3 is obtained. A center tap on the secondary of the filament transformer is used to keep down the amount of hum in the rectified output, which is caused by lighting the filament from A.C. Athough the ends of the secondary winding reverse their poten-

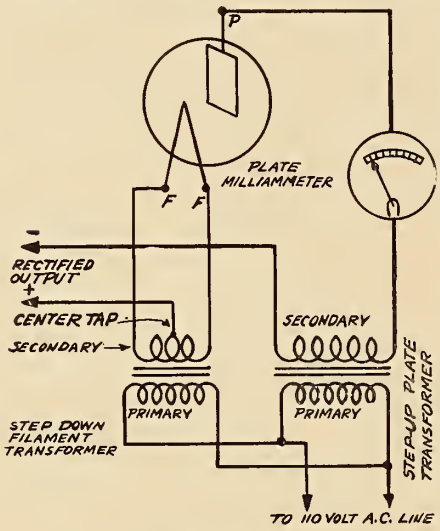


FIGURE 3

Half-wave rectifier circuit

tial sixty times a second, the center tap does not vary in potential with respect to the center point of the filament. A seesaw forms a good example of the action that takes place, with the point on which the plank is balanced representing the center tap on the transformer secondary. The secondary voltages of the filament and plate transformers depend on the type of tube employed and the rectified output voltages desired.

Full-Wave Rectifier

A full-wave rectifier of the type used in sound reproducing systems is illustrated in Figure 4. This circuit receives its name from the fact that it rectifies both halves of the A.C. cycle. For the purpose of explanation, two high-voltage plate transformers are shown, athough actually a single-plate transformer is employed with a tap brought out at the electrical center of the secondary winding.

Now, when the terminals of the high-voltage transformers marked *X* are positive, the plate of tube *A* is positive and that tube passes current on that half of the A.C. cycle. At the same instant, the plate of tube *B* is negative, and so that tube does not pass plate current. When the A.C. current reverses polarity on the other half of the cycle, the terminals marked *X* become negative. Then the plate of tube *B* becomes positive and that tube passes current; but the plate of tube *A* is negative and so it does not pass current.

Typical Rectifier Circuit

Figure 5 explains diagramatically the functioning of the two rectifier circuits. At *A* is shown two complete A. C. cycles or waves, (from *X* to *X* being one cycle). It will be seen that the voltage begins at zero, rises to a positive (+) value, falls to zero, rises to a negative (—) value, and again falls to zero in one cycle. A half-wave rectifier rectifies only the positive peaks, as shown at *B*, the negative peaks (represented by the dotted lines), being lost. But a full-wave rectifier rectifies both peaks of the cycle, as illustrated at *C*.

The output voltage of the half-wave rectifier circuit shown in Figure 3 is equal to the secondary voltage of the plate transformer minus the small voltage drop (or loss), through the rectifier tube. The output of the full-wave rectifier of Figure 4 is equal to the secondary voltage of either one of the plate transformers (which must be of exactly the same voltage rating), minus the voltage drop through the corresponding tube. Or if a single, center-tapped plate transformer is employed, the output voltage is equal to one-half the secondary voltage minus the drop through one of the tubes. Filament and plate transformer secondary voltages of 4.5 and 350 are usual with rectifier tubes of medium power, such as the W. E. 205 type.

When a vacuum tube is used in this manner, it acts as a "valve" in the circuit, for it permits current to flow in

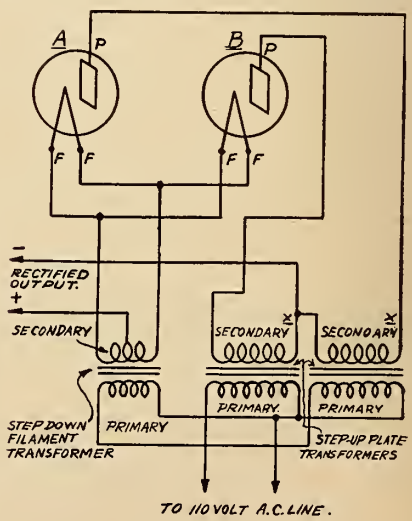


FIGURE 4

Full-wave rectifier circuit

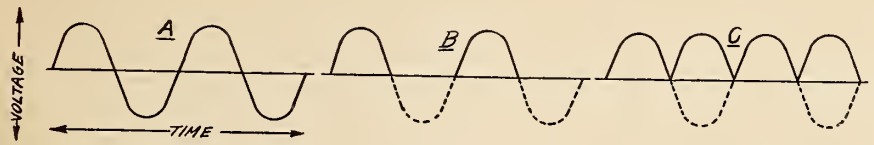


FIGURE 5. *Diagrammatic representation of the functioning of rectifiers, showing how A.C. is rectified to pulsating D.C.*

but one direction. This use as a rectifier is the only one to which the two-electrode tube lends itself. Two of the four tubes in both the 42-A and 43-A (W. E.), amplifiers are employed in this manner to provide plate voltage for the other two tubes that serve as amplifiers. Three-electrode tubes are used for this purpose, so that fewer types of tubes will be needed, but they are connected as two-electrode tubes, their grids being left unconnected.

Subsequent installments will discuss the functioning of that all-important electrode, the grid, and the operation of vacuum tubes as amplifiers. Appended hereto is a group of questions which will serve as a review of the information given in the article just concluded.

Questions, Article I:

1. What is the "Edison effect"?
2. What is the purpose of the filament in a vacuum tube?
3. Why must a center tap be used on the secondary of the transformer when A.C. is used for the filament supply?
4. What is the "space charge"?
5. What substances are used on an oxide-coated filament?
6. How are electrons emitted from the surface of a hot metal in vacuum?
7. Why is a vacuum tube said to be a unidirectional conducting device?
8. From what portion of a thoriated filament does the electron emission come?
9. Why must a positive potential be applied to the plate to obtain normal operation of a vacuum tube?
10. What is the difference in the rectified output of the half-wave and full-wave rectifiers shown in Figures 3 and 4?

PERFORATED SCREEN NO BAR TO GOOD PROJECTION

J. S. Ward

DIRECTOR OF OPERATIONS, ELECTRICAL RESEARCH PRODUCTS

THE statement that the advent of sound revolutionized the motion picture industry has become a bromidium; everybody knows that radical and fundamental changes have taken place since 1926. And not the least of these has been in the character of the projection screen.

In the early days of the silent picture era, the screen was almost the last detail to be given attention. For years any flat, light colored surface was deemed good enough for a screen; but once the fact was recognized that the screen played an important part in a picture's presentation, its development was rapid.

Then came sound pictures, and the newly perfected screen was shot full of holes, both figuratively and literally. Naturally. For the sound *had* to come from the direction of the picture, hence the only logical place for the horn—the source of the sound—was back of the screen. And when the sound tried to get through the solid screen, it didn't sound like the same sound. Therefore, the only thing to do was to make holes in the screen, and with characteristic enterprise the industry set forth to make the best of the holes.

Early Position Experiments

At first, sound picture loud speakers were placed at various and sundry locations about the screen. Between the twin problems of illusion and sound distribution, it was soon found that no "standard" position relative to the screen would insure satisfactory results in the many contrasting types of theatres.

Hence, Electrical Research Products, at an early date began experimentation with porous and perforated screens. Types enabling good sound results to be had while still providing acceptable pictures, were soon available.

The problem yielded readily to attack. In the beginning, however, when the matter of sound transmission was considered all-important, the perforations were made so large and so numerous that the picture suffered decidedly. It was soon found that only a relatively small percentage of open space was necessary, and in the present screens the reduction in area ranges from 5.8 per cent, to 8.5 per cent, with the easily tolerable loss of approximately 3 decibels in the sound transmission.

Two physical objections to the perforated screen present themselves: loss of brightness, due to loss of screen area; and appearance, due to the perforations themselves. Now, brightness is a function chiefly of area and of illumination. Tests show that screen illumination varies greatly from place to place, being frequently 50 per cent and in some cases as much as 100 per cent. If we take 8 per cent as the average decrease in effective screen area, it will at once be apparent how relatively unimportant this factor becomes as compared with the probable variation in illumination value.

Punch Visibility Unimportant

The objection that perforations may be visible from the auditorium, thus marring the appearance of the projected picture, will usually be unimportant. The limiting distance at which perforations one-sixteenth of an inch in diameter are barely visible is eighteen feet. Not many seats are as near the screen as this, and in many makes of screens the perforations are of even less diameter.

We may conclude, then, that the disadvantages due to the perforated screen are relatively small, and it will readily be appreciated from this brief review of the subject that in the interest of providing their audiences with convincing sound picture operation, practical showmen will adhere to the use of screens which insure, at the same time, a satisfactory picture and sound of natural quality and pleasing illusion.

Simplex Booklet Available

International Projector Corp. has available for readers of INTERNATIONAL PROJECTIONIST a limited supply of booklets containing a general description of and operating instructions for their latest model projector, the Super Simplex. Copies of this booklet may be had without charge by addressing the projector company at 92 Gold Street, New York, N. Y.

First come, first served.

ERPI PROMOTIONS

Electrical Research Products has announced the following promotions, effective immediately:

Harry Dodge, Central Division General Manager to General Manager of the Western Division; Stanley Hand, Northeastern Division Sales Manager to General Manager of the Central Division succeeding Dodge; Bert Sanford from Merchandising Manager to Northeastern Division Sales Manager succeeding Hand.

THE NEW BRENKERT A.C. PROJECTION LAMP

Karl Brenkert

BRENKERT LIGHT PROJECTION COMPANY

THE A. C. arc was developed for the purpose of producing higher screen intensity than a low-intensity lamp and duplicating the white light characteristics of the high-intensity lamp at a cost of operation comparable with that of low-intensity lamps.

After a long period of development and thorough test the new Brenkert *Model K* alternating current lamp was placed on the market and is now used in theatres in most sections of this country. The improvement in screen illumination over the low-intensity lamp is very apparent, as the light is snow white and the intensity considerably greater. These results are of considerable importance to users of low-intensity lamps who cannot afford the operating costs of the high-intensity type, direct current arcs.

Two flaming type carbons of the same size and characteristics are used at high current and low voltage and are burned in a horizontal position. The light from the front carbon *only* is utilized. Of considerable importance is the even screen illumination and the fully automatic operation which can be obtained from this type of arc when used in a properly designed and constructed lamp. Using alternating current at the arc permits the use of a regulator-type transformer for current supply in place of a generator with rheostats or other current rectifying devices. The greater efficiency of the regulator over current conversion or rectifying devices results in less current costs.

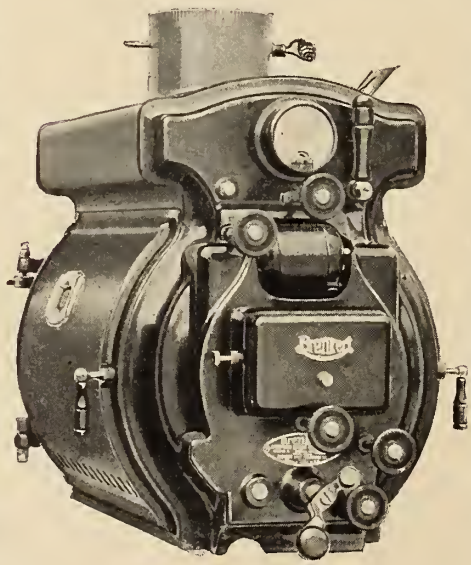
Better Light—Less Cost

The carbon costs are higher than for low-intensity, direct-current lamps, but the saving in current results in combined current and carbon costs per hour of operation being but slightly more than is the case with low-intensity lamps operating at 30 amperes.

The A. C. arc is fundamentally the most sensitive of any that has yet been used for motion picture projection. The arc gap fluctuation that can be and is allowed in direct-current arcs would in the A. C. arc produce considerable variation in screen intensity as well as change in color of the light. The arc-controlling means, therefore, becomes a highly important factor.

The Brenkert Light Projection Co., in cooperation with this publication, will gladly answer, either directly or through these columns, any questions relative to any phase of the design, construction or operation of this new A. C. lamp. Inquiries may be addressed either to the Brenkert Co. in Detroit or to this publication.—Editor.

The automatic arc-controlling means of the Brenkert *K* lamp overcomes these difficulties by maintaining the arc within a 2% current variation. This closely approximates the accuracy of the best types of meters. With this extreme sensitiveness one might at first believe the arc control must be made of small delicate parts. Quite the contrary, the Brenkert control is of rugged construction, requires no oiling and no cleaning of contacts, and its life is indefinite. It is built over the basic principle of a dynamometer with the contacting means a heavy mercury switch of long life. The enclosed mercury switch makes and breaks the current to the feeding motor, which is of sufficient power to feed the carbons at a correct rate of speed to maintain stability of this sensitive arc regardless of varying friction of the lamp mechanism, which can be caused by the mechanism being warm or cold, or oiled or dry.



Rear view of the Brenkert Model "K" lamp, showing ammeter, motor, arc-control unit and control handles

On all automatic-feed mechanisms used on low-intensity lamps the feeding is actuated by either voltage variation of the arc or by the combined variation of the arc voltage and arc current. Such arc-controlling means require the feed actuating mechanism to be either wholly or partly a circuit separate from the arc. Temperature changes cause a change in resistance of such circuits which requires a manual adjustment by the projectionist to compensate. The arc control of the Brenkert *K* lamp is wholly in series with the arc, and, therefore, changes in temperature of the lamp do not effect its feeding characteristics. The control of this lamp can be set for the arc current desired, and this adjustment remains set under all operating conditions. The mercury switch with its air tight contacts eliminates all contact difficulties.

Steady White Light

These important characteristics of the Brenkert control mean that the arc is automatically so well regulated at all times that the light on the screen remains constant and snow white. The screen illumination is even, and although of greater intensity than a 30-ampere, low-intensity lamp, it is of less intensity than an efficient high-intensity, reflector type lamp operating at 75 amperes. The lamp is quiet in operation, the arc is steady and does not interfere with the sound system.

The Brenkert *K* lamp has all controls centered on the back plate. An ammeter is also mounted on the back. The feeding motor with gear reduction is one unit mounted from inside the back

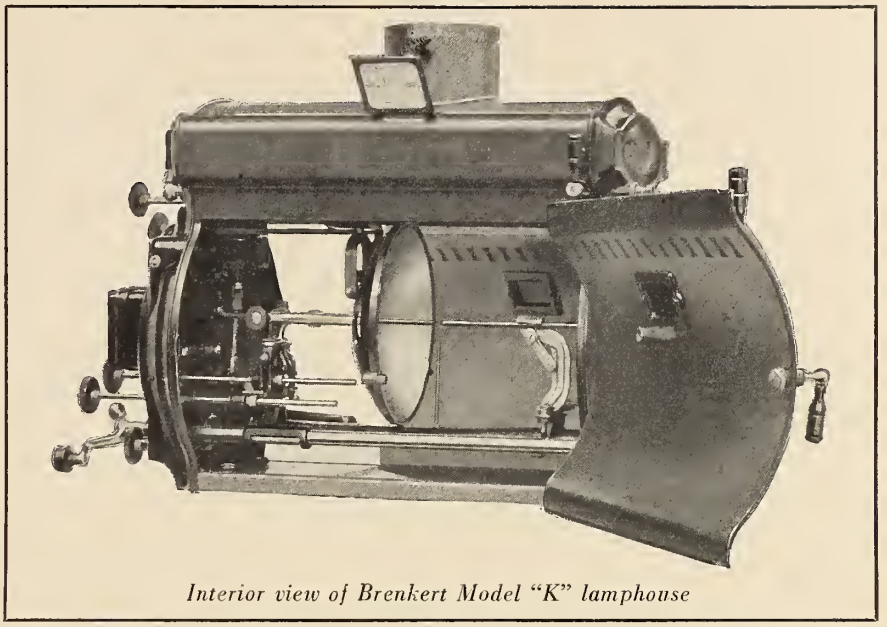
plate. The sensitive operating relay and connecting panel is one complete unit mounted in a dustproof case on the back plate. All these units are readily accessible and quickly removable.

Miscellaneous Features

Large opening doors with heavy end braces are securely hinged to the front plate and open in a horizontal plane, permitting free access to all parts of the lamp mechanism from either the right or left side. The floor is free of all obstructions, facilitating cleaning. A compound lens system on the right-side door images the arc on a white screen at the lamphouse top, permitting the projectionist to very accurately focus the arc and at a glance observe the burning of the carbons. Arc focussing and regulating is Micrometer screw accuracy. Arc vision glasses are heat-resisting and of proper computation to eliminate harmful actinic rays.

Positive and negative carbon holders are constructed to facilitate trimming and securely grip the carbons, and are made of a proper alloy to withstand high temperature. Current lead wires have contact lugs attached under press power to completely protect the small copper strands and eliminate those parts burning off.

The reflector is Pyrex to withstand the heat, is of elliptical curve and proper computation to produce light on the screen of even illumination from edge to edge. It operates at high efficiency, intercepting the greatest angle of light emitted from the arc consistent with practical considerations. The generous use of aluminum makes the lamp lightweight, without sacrificing ruggedness. Standard finish is satin black enamel, end plates with blue steel housing and nickel plated trimmings, presenting a handsome appearance in any projection room.



Interior view of Brenkert Model "K" lamphouse

The regulator-transformer used with the new Brenkert Model "K" A. C. lamp

The Brenkert compensator transformer for use with this lamp operates on any A. C. line of 95 to 130 volts, or 190 to 260 volts. An adjustment handle extending through the top plate actuates a screw which adjusts the arc input to any fractional part of amperage desired. The compensator is ruggedly built in accordance with standard electrical specifications and is well finished in satin black with nickel trimmings. There are no moving parts to wear or require oiling.

Savant Sees American Labor Unions Revivified by NRA Codes

NOTE: Professor Sumner H. Slichter's liberal views are well known to readers of INTERNATIONAL PROJECTIONIST, in which appeared his short series of articles under the general heading of "The Philosophic Background of Unions", concerning which many favorable comments were made within the craft.—*Editor.*

TRADE unionism will become entrenched throughout American industry as a result of the impetus given it by the NRA, Sumner H. Slichter, Professor of Business Economics at the Harvard Graduate School of Business declared recently at the twelfth annual Autumn conference of the Personnel Research Federation.

Professor Slichter told the gathering of personnel directors, psychologists and employment experts that a year ago he would have "speculated on whether trade unions would survive." But in the last five months, he added, "unionism has gained more than it lost in the last thirteen years." He pointed out that during the last five or six months some 700 charters had been granted by the American Federation of Labor.

Industrial Unions Wanted

"Within these few months," Professor Slichter said, "the Federation reached a new peak in its membership. Most of this growth it will probably retain. How much further and how fast it will go depends on the success in working out a form of organization satisfactory to employers, some employes and existing trade unions.

"There is at present a strong demand on the part of employers and the rank and file of newly organized wage earners for the industrial form of organization. This cuts across the A. F. of L. at some points. Until the resulting complications are ironed out growth in the Federation membership is likely to be retarded.

"The A. F. of L. had a great opportunity to organize the working people and has thrown that opportunity away. That is an unfair statement, perhaps, but after all the A. F. of L. does not exist for organizing but rather for the preserva-

(Continued at foot of next page)

PROJECTIONIST APATHY BARS CRAFT PROGRESS

M. D. O'Brien

ASSISTANT DIRECTOR OF PROJECTION, LOEW THEATRES
SECRETARY, PROJECTION ADVISORY COUNCIL

FOREWORD: This article originally was a personal letter from Mr. O'Brien to Stanley T. Perry, President of the Guild of British Kinema Projectionists & Technicians, and was not intended for publication. So accurately does the letter mirror prevailing conditions within the craft, however, that Mr. O' Brien was prevailed upon to release it for publication, which he graciously assented to do.—EDITOR.

YOUR current *Projectionists' Journal* containing a report of the annual meeting of the Guild. includes the remarks of several members relative to the very apparent growing apathy of some members toward their work and their craft. Obviously, you are suffering from the same disease with which American projectionists have been afflicted for several years now.

I date the introduction of this apathetic attitude to the advent of sound pictures. Up to that time projectionists generally were hard-working, ambitious craftsmen. Educational organizations were making fine progress, with the business meetings being given over largely to the induction of new members. Lecture and demonstration sessions were well attended by men who seemed hungry for information. One organization in particular became very strongly intrenched throughout America, with some 26 chapters being organized in key points.

Members of this organization soon gained recognition as thoroughly dependable craftsmen, always well-informed regarding the latest projection developments. Many of the projection devices which are today considered indispensable projection room necessities were developed by this organization's members. I need mention only a few such developments: even-tension take-up, rear shutters, lens turrets, and the magnascope screen, in addition to many "tricks of the trade" which today are commonplaces of projection rooms.

Nothing of a political or secular nature was permitted to intrude upon this society's business. Education held full sway.

And then came sound pictures.

After Sound—What?

One would immediately conclude that sound pictures intensified, rather than diminished, the need for educational activities. But something happened to produce just the opposite effect. The flurry of new installations operated to bring to a complete halt the educational sessions then in progress. Of course, it was thought that once the projection room returned to a more or less even keel, these sessions would be resumed with increased vigor. But they never were.

Education anent the intricacies of sound equipment and its operation was seriously handicapped by the so-called "electrics" themselves. We were assured that there was no need for our learning "too much" about sound equipments, because the "electrics" themselves would inspect, service, maintain and repair all essential equipment.

Waiting Without Watching

So we projectionists just sat back and let matters run their course. After a spell of this sitting back we found it impossible to rouse ourselves from our lethargy. We entered upon a period which saw the vogue of the service man—not only for sound equipment but for changing mechanisms, replacing working gears, and oiling and greasing our projectors. No attempt was made to properly educate the new men who swarmed into the craft, as a result of the sudden demand for manpower, and their lax attitude quickly communicated itself to the older men.

In fact, we soon found ourselves doing practically nothing but threading the film into the mechanism. If a tube burned out, the service man appeared like some grim spectre at our elbow and replaced it. If a fuse blew, most of us pulled up a campstool and waited for Service Man No. 8,762, who, you must know, looked after fuses exclusively. Did the batteries require a little water? Presto! someone appeared with water.

In fact we were practically wet-nursed from the inception of sound. We were petted and pampered, and we quickly developed a tendency to stand around and helplessly suck our thumbs. By now we have grown to like the taste of our thumbs, and we are almost beyond the point where we can be broken of the habit. Mental or physical effort of any kind is a thing of horror to most of us. "Call the service man."

Everything being done for us, the educational societies soon gathered generous coatings of dust through idleness. Having nothing but plenty of time on their hands, most of these societies proceeded rapidly to demonstrate how easy it is to get into mischief. This they did with a startling show of efficiency.

Trouble Looms Ahead

The past five years have witnessed the almost complete disintegration of craft organization. The aims and ideals of the pioneers of the projection craft were swept aside like so much chaff before the wind. That licking which we have had coming to us for five years now—that licking which we invited and then did nothing to prepare ourselves to take—is now just around one of those famous corners. Of course, we won't take this licking like good soldiers. We'll yell and we'll beef and we'll holler to high Heaven—but this won't forestall the beating that is heading our

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NRA Codes to Revivify Unions

(Continued from preceding page)

tion of the autonomy of constituent unions to prevent them from being bossed and overwhelmed by outside organizations."

Professor Slichter saw two opportunities in the future for trade unionism to develop, saying:

Codes Offer Opportunities

"First, if there is pronounced inflation I believe it will strengthen the A. F. of L. and employee representation plans. When there are wage increases in the picture the employes' representatives come into their own and get credit for the increases which would have come as a matter of course.

"The other opportunity is presented by the codes. Some way or other the codes have to be enforced. If the unit representation is to be the plan, it will make for an industrial form of organization which does not fit the A. F. of L. If the A. F. of L. fails to organize the large industries under the codes I suspect that independent organizations will develop because of the code and become increasingly independent. I think the real unionism is coming in American industry through one group or the other."

Professor Slichter said that with two years of operation under the NRA industry would find the codes indispensable, although it would take a generation to learn how to operate under them.

MATHEMATICS FOR THE PROJECTIONIST

Gordon S. Mitchell

IV. The Slide Rule

DURING the many years since the science of mathematics has been developing, mathematicians have worked out tables and charts which present short cuts in performing desired mathematical operations. One of these short cuts is the log table; still another and a further development of the log table is the slide rule.

The slide rule may be obtained in a great number of forms, in various sizes, and containing various tables for performing various operations. Slide rules designed for these special operations will not be considered in this lesson, but the projectionist should be entirely familiar with the principles governing the operation of the ordinary log slide rule, and, if possible, should have some facility in performing mathematical problems on it.

On the slide rule, one scale moves along the other to permit various combinations of numbers on the two scales to be effected for the operations of multiplication and division. Before observing the relationships between these two scales, reference should be made first to the possibility of manipulating two identical measuring sticks, such as foot-rulers or meter sticks, for the performance of addition and subtraction. These are unit scales and begin with zero, instead of with one as on the Slide Rule scales. It should also be noted that the consecutive integers on the inch scale are equidistant, in contrast to the whole numbers on the Slide Rule scale, whose distances from each other decrease toward the right.

Addition and Subtraction

In order to add by measuring rather than by the usual method of counting, one might use one scale alone and a pair of dividers. For example, if the distance 3 on the unit scale were measured off with the dividers and laid next to 2, the total distance would be 5 on the scale, marked off by the right-hand leg of the dividers. However, to eliminate the use of dividers, two scales must be used.

Now, if the beginning of the upper scale is placed directly over the 2 of the lower, 5 may be read on the lower. By setting off the distance 2 on the lower scale with the edge of the upper, 2 is added to any number on the upper scale and the sum read on the lower. However, when 2 is under 0, 3 is under 1, 4 under 2, 5 under 3, and so on for every successive number.

Subtraction is merely the reverse of addition: using the addition problem outlined above which shows 2+3=5, the same numbers in the reverse order form a subtraction problem 5—3=2. It is easy to see how subtraction would be performed with these unit scales: If the 3 of the upper scale were placed over the 5 of the lower, 2 would appear as

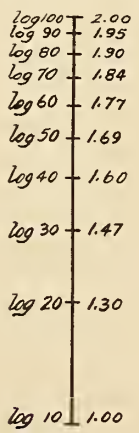

Figure 1

the remainder on the lower scale under the end (zero), of the upper, and the setting would look the same as for the addition of 2 plus 3.

Addition is the building-up process and subtraction is the tearing-down process. By placing the 3 over the 5, the distance 3 is cut off of the distance 5, and the distance 2 remains projecting

Figure 2

out to the left. It should be clear that addition necessitates the measuring off of one of the distances first, in order to add it to the other on the second scale, the sum being read under the last distance.

The slide rule proper, as it is used by engineers, is based upon the principal of logarithms, as was stated above. In Figure 1, we show the relation between the logarithm of a set of numbers from 10 to 100, the value of these logs being between 1 and 2. This relationship, in tabular form, follows:

Log 10=1.00
Log 20=1.30
Log 30=1.47
Log 40=1.60
Log 50=1.69
Log 60=1.77
Log 70=1.84
Log 80=1.90
Log 90=1.95
Log 100=2.00

Two such scales, placed one above the other and arranged so that one may be moved in relation to the other, constitute a slide rule in its simplest form. (Fig. 2.)

Multiplication Process

In order to multiply with the slide rule, the top or movable scale is moved to the right. For instance, suppose we wish to multiply 3 by 2. The movable scale

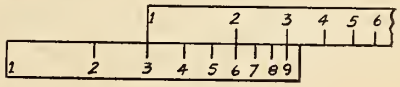

Figure 3

is slid to the right until the left-hand index (the one on the movable scale), is directly over the 3 on the lower scale, as is shown in Figure 3. Reading directly under the 2 on the upper scale, we find the product of our multiplication which is 6. You will notice that should we want to multiply 3 by 3, we are able

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way with not a little momentum behind it.

Can we duck this beating? I think "yes". But in order to duck it we will have to get down to brass tacks at once and resume where we left off five years ago when we first started flirting with that lady of false promises, Miss Apathy. Educational activities should be fostered by organizations—national, sectional, and local—and by this I do not mean to exclude the labor organizations. They should be in the very forefront of the movement, because, as Joseph Bliven remarked in these columns last month, they stand to get the most out of it.

to read the answer 9 directly under the 3 on the movable scale. In other words, the answers to a series of calculations using the same multiplicand can be obtained with one setting of the slide rule.

Figure 4 shows the relation between the scales when multiplying 5 by 2.

Of course, the commercial slide rule is so drawn up that the scales show divisions between the unit numbers, making it possible to multiply fractions of numbers as easily as whole numbers.

It is apparent that for a multiplication of certain numbers it will be necessary to move the scale to the left instead of to the right. If, for example, it is desired to multiply 6 by 5, the right hand index is placed directly over the 6 and the answer, 30, read directly under the 5. (Figure 5.)

In the foregoing calculation, we find that we don't read the answer 30 directly from the slide rule, inasmuch as the number 3 only appears under the 5 of the movable scale. The figures making up the two scales may be considered not only as united but, for purposes of calculation, as tens, in which the divisions between each figure (not shown on the drawing), would then be considered as units; as hundreds, in which case the units between each number would be considered as tens; even as thousands, in which case the divisions between numbers would be hundreds; or as decimal portions of one, as for instance, the numbers might be considered as tenths, in which case the divisions between would be hundredths; as hundredths, in which case the divisions between would be thousandths, and so on.

This brings up a consideration of placement of the decimal point when making slide rule calculations. When multiplying two figures which are such that it is necessary to slide the movable scale to the left, the answer will contain as many figures to the left of the decimal point as the sum of the figures to the left of the decimal point in the two numbers being operated upon. For instance, when multiplying 84.7 by 4.6, the answer would contain three figures to the left of the decimal point (in other words, would lie between 100 and 999), obtained by adding the number of figures (two) before the decimal in the

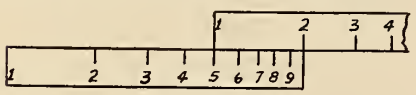


Figure 4

multiplicand *to* the number before the decimal in the multiplier (one).

However, when it is necessary to slide the movable scale to the right, the answer will contain (to the left of the decimal point) one less than the sum of the figures to the left of the point in the two numbers being operated upon. For instance, when multiplying 23.1 by 355.0, the answer would lie between 1,000 and 9,999, or, in other words, would have

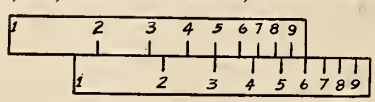


Figure 5

four figures ahead of the decimal point.

We have seen that multiplication operations can be readily performed on the slide rule. Division may be thought of, for the purposes of this lesson, merely as a reverse multiplication operation, and as such may be done on the slide rule with comparable ease.

Division by Slide Rule

Referring again to Figure 3, let us consider for a moment the division of 9 by 3. If we place the scale of the movable member of the rule so that the 3 is directly over the 9, we are able to read the answer, 3, on the stationary scale directly under the left-hand index. In the same figure, if we are dividing 6 by 2, we read the answer 3 under the left-hand index in the same way. In Figure 5, if we are desirous of dividing 30 by 5, we read the answer 6 directly under the right-hand index on the stationary scale.

The rules governing the placement of the decimal point in a division operation are as follows:

When the figures are such that the movable scale is slid to the left, the answer will contain a number of digits to the left of the decimal point equal to the difference of the number of digits in the two numbers being operated upon. However, when the figures are such that the movable scale is slid to the right, the answer will contain a number of digits to the left of the decimal point which is equal to the difference in the two numbers being operated upon, plus one.

These rules, however, are not nearly as complicated as they seem, and with a little practice in the manipulation of the slide rule will be found to be extremely simple and practical. With the simpler multiplication and division operations, decimal placement is a matter of observation, and while the above rules hold, of course, one will not find it necessary to physically calculate the number of figures in each number and actually make the indicated additions or subtractions.

Answers to Problems, Article III

WITH but two exceptions the answers to the questions accompanying Article III of the series "Mathematics for the Projectionist" are so uniformly poor that they merit precious little comment herein. Out of nearly 100 papers, only the answers of two old stand-bys are correct in every particular.

It is true that the problems appended to Article III were the most difficult to date, and it is barely possible that the problems posed evidence a tendency on the part of the author to hurry his "class" along. Still, every phase of the problems has been covered in the last several issues, and it is significant that a majority of the errors which showed up in the papers are traceable directly to carelessness—such as the substitution of a minus for a plus sign or a failure to recognize the simple and plainly expressed instructions.

As much for the benefit of those who submitted answers to Article III as for the prestige of I.P., it appears desirable that the entire group of questions be reprinted this month, and an invitation extended to the "class" to try again. Meanwhile, a sheaf of representative answers will be forwarded to the author, Gordon Mitchell, for review with an eye to writing a special paper pointing out the common errors that were made.

The problems, presented for the second time, follow:

10. In the following, solve for the unknown, showing each step in order to indicate the proper order of separation.

(a) $x = 10 \cdot 7 - 7^2 + \frac{1400 + 3^3 - 49 + 20}{20}$

(b) $y = 20 + 7 + (7 + 2) - (4 - 2)^2$

11. Subtract:
(—10+1—2+5) from (7+10—3+2)

12. (a) Multiply: —5 by 7.

(b) Divide: —32 by —4.

13. Solve the following equation to obtain the value of "x":

$$4x + 7 = 2x - 3$$

JONES ADVANCED BY RCA

The RCA Victor Co. has announced the appointment of Harry W. Jones as sound supervisor in charge of all the company's film recording operations in New York. Mr. Jones was formerly sound engineering advisor to Photophone sound licensees in New York and Hollywood and has been associated with sound motion pictures since the early developmental days of 1919. He has had considerable practical experience with the company's High Fidelity system of recording.

SHAUGHNESSY AND MARTENS AGAIN HEAD L. U. 650

James Shaughnessy and Arthur Martens have been unanimously re-elected president and business representative, respectively, of I.A. Local Union 650 (Westchester County, N. Y., projectionists), and both have been named as delegates to the next I.A. Convention. The entire executive board supporting these men, both of whom have been officers of the Local since its inception, were also voted into office.

'AUTOMATIC' CHANGE-OVERS

George C. Edwards
PAST PRESIDENT, AMERICAN PROJECTION SOCIETY

THE trickle of ideas for "automatic" change-over devices has swelled into a deluge, with several more "ideas" reaching us recently. One of these devices is so far removed from any semblance of practicability that we can lay it aside for a year or more, to ripen, as it were.

Indicative of the lengths to which "inventors" seem willing to go in making "automatic" change-over equipments is an ingenious attempt by a California inventor to coordinate the work of the S.M. and C.O. cues of the Standard Release Print. The description of this device reads well, but close inspection reveals it to be a somewhat elaborate electrical and mechanical device, the function of which is to perform a manual operation which at present offers no serious difficulty. Incidentally, the device requires a certain amount of manual adjustment and setting before it will work properly, and it apparently does not provide a means for fader manipulation or arc-striking. Thus, the "automatic" angle may be taken with several grains of salt.

Consider the description of this particular device:

"The device consists of a pair of trip mechanisms, one for each upper reel, a change-over unit, and the necessary switches controlling the two projectors and their dowsers. A trip mechanism is built into the reel and its hub, so arranged that the reel may be placed in the magazine or removed in the usual manner. This minor change can be easily made by the projectionist.

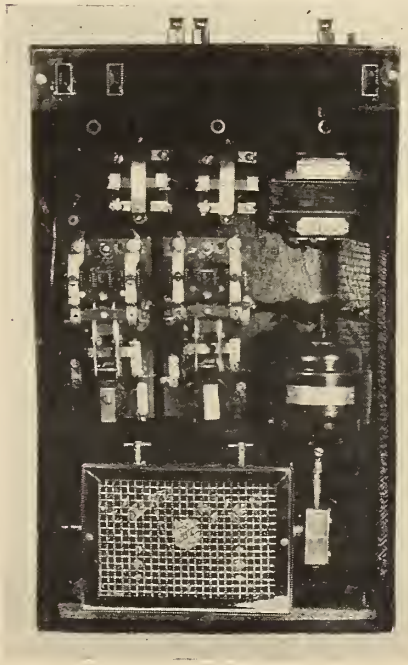
"The trip mechanism does not require any cue marks or change in the film, but utilizes a particularly efficient lever which does not injure the film and which is inserted between convolutions (layers), of the film and moves clear of the film when uncovered. This trip lever mechanically operates a switch located away from the reel. This switch is in series with one arm of the magnetic switch and a low-voltage magnetic coil located within the change-over unit, there being one magnetic coil connected with each projector. Connecting the switch, the arm of the magnetic switch and the magnetic coil in series, prevents the trip mechanism from functioning unless the projector is in operation.

"The change-over unit comprises a small motor which runs continuously and drives a shaft extending back of a panel. Arranged along this shaft are a pair of clutches and controls, one for each contact drum. This unit complete is mounted in a small cabinet which can be placed anywhere in the projection room.

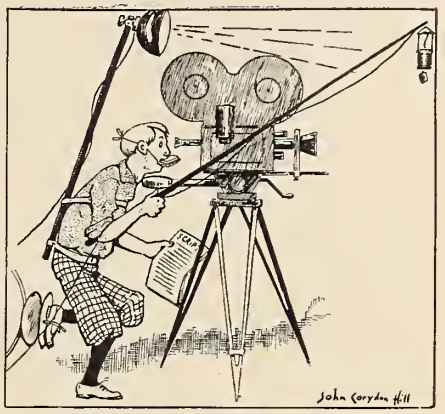
"By action of the trip mechanism on the reel and the switch on the end of the shaft, the magnetic coil is energized, putting into operation the corresponding clutch on the shaft which rotates the contact drum for one complete revolution, whereupon the clutch disengages and the drum stops. After the change-over has been completed, the unit is automatically set for the next operation.

"When the contact drum turns in response to the trip mechanism of one projector, it moves clockwise to engage the first contact. This contact operates a locking magnetic switch which closes to start the other projector. The next contact operates a momentary magnetic switch which causes the dowsers to change. Then the last contact is engaged, which opens the locking magnetic switch controlling the first projector. Sufficient time is provided between the engagement of the several contacts to enable the beginning projector to reach its proper speed before operation of the dowsers. Also, the completed film is completely rewound upon the lower reel before its projector is shut off. The time relation between the dowser controlling contact and the other contacts may be readily and quickly varied, if desired.

"The projectionist, when rewinding a reel, inserts the trip lever of the trip mechanism at the proper distance from the end of the reel (if S.R.P. cues are used, the lever is placed upon the film at this point), and upon placing the reel in its magazine the trip mechanism is set. The reel may be removed or inserted repeatedly without danger of operating the trip mechanism, because the circuit which it controls is incomplete unless the projector is in operation.



'Automatic' change-over unit



"International Photographer's" impression of how a cameraman would look if the producers' ideas on codes prevailed

"At any time, without interfering with projection, the automatic change-over device may be disconnected and manual control used, by merely throwing a switch."

Now, let us see just what this device is all about. First, the user of this device will require a complete set of reels of the same diameter hub, which must run perfectly true upon the upper magazine spindle shaft. Any reel which shows even a slight wobble is out of the question. Into this reel must be built the lever mechanism, and if the device is to be of any use at all, this job may not be so easily accomplished without special facilities.

To work the device the lever must be placed *exactly* at the correct point when rewinding, and care must be taken to see that there is no creeping or slippage of film, which condition is often encountered in rewinding, especially at the beginning. It is claimed that the insertion of the trip lever cannot in any way injure the film, and that it moves out of the way when uncovered. Immediately arises the question: Where does it move to? In a majority of cases there is less than ¼ inch clearance between the wall of the magazine and the upper reel, and if the reel is the least bit bent, one may expect troubles in profusion.

Setting the trip lever still is a manual operation, of course, and the possibility of error in the setting process is recognized by the inventor by providing a switch permitting the cutting out of the apparatus and allowing manual operation in the usual manner.

Here is an example of an enormous amount of thought and ingenuity being spent to develop a mechanism, of considerable cost, to perform the work of about five seconds duration, and the device *must* be supplemented by manual labor, in absolute synchronization. Also, there is the additional disadvantage of not knowing if all the factors for perfect performance are present.

As an effective aid to the projectionist, this device at present lacks many features which might make it acceptable.

THE CODE DEPARTMENT

A New Service By INTERNATIONAL PROJECTIONIST

NOTE: In this section each month will appear the latest news of and views upon developments in the operation of the moton picture code, particularly with respect to the labor sections thereof. Official interpretations of code language; the results of arbitration proceedings, and news of hearings held before the various local, sectional and national boards—all will be recorded herein. Individuals and organizations are urged to submit reports of their code activities, as an aid to others.

As a further service to its readers, *International Projectionist* has established a Code Department, ably manned and having the benefit of competent legal advice, to which may be referred, on a strictly confidential basis, all questions relating to the motion picture code. This service is gratis, of course, to readers of this publication—*Editor.*

I. A. ISSUES INTERPRETATIONS

Elliott Statement Admits Hour Overage Is Labor's Load—Weekly Hour Maximum Affects all Contracts—Arbitration Procedure Outlined—'Meditation' Agreement Confirmed—Silent On Meaning of 'Prevailing Scale'—Official Release Omits Last Four Sections

IN a statement broadcast to every affiliated unit, President William C. Elliott has issued the long-awaited and much-speculated upon official I.A. interpretations of the labor sections of the motion picture code. Accompanying his statement was what he termed "a correct copy" of the labor provisions, although it is noteworthy that the four last sections of the labor section were not included therein:

These sections are as follows:

Section 8. With respect to any employee not hereinbefore provided for, such employee when directly and regularly employed by the Exhibitors shall be paid not less than forty (40) cents per hour.

Section 9. By reason of the professional character of their employment, the minimum wage and maximum hours of employment of employees performing the duties of musicians shall as heretofore be established by prevailing labor agreements, understandings or practices.

Section 10. With respect to disputes arising between employees and employers in the EXHIBITION branch of the Motion Picture Industry, the parties pledge themselves to attempt to arbitrate all such disputes.

Section 11. The Administrator after such notice and hearing as he shall prescribe, may revise or modify any determination of any dispute pursuant to Section 6 of Part 1, of division C of this Article IV.

The reason for the omission of these last four sections is not quite clear, inasmuch as they relate to important points such as the virtual withdrawal of the musicians from any participation in the code, to the agreement of both labor and employers to arbitrate, and to the right of the Administrator to revise or modify any "determination of any dispute".

The final code draft as officially approved differs from that copy of the code which was broadcast throughout the field by INTERNATIONAL PROJECTIONIST in mid-October *only* in the substitution of three words throughout the entire section, but one of these substitutions is very important and the reason for it is not yet understood.

As originally reported Section 6 (a), in dealing with maximum hours of work and prevailing scale of wages, read:

> " . . . who are directly and regularly employed by the Exhibitors, shall receive not less than the minimum wage and work no longer than the maximum number of hours per week which were *fixed* as of August 23, 1933, as the prevailing scale of wages and maximum number of hours of labor by organizations of any such employees affiliated with the American Federation of Labor . . . . "

The final code draft substitutes for the word "fixed" above (in italics) the words "in force", which means that the conditions referred to actually had to be *enforced* and not simply prevailing, on August 23, 1933.

In all other particulars, however, the code release by this publication is correct down to the last line, and it had the added advantage of omitting nothing.

A verbatim transcript of the release by President Elliott of the I.A. follows:

For your help, we are outlining some interpretations and methods of proceedure under the Motion Picture Code which may be of assistance to you. Attached hereto you will find a correct copy of C, Part I, Sections 6 and 7, which are the sections that pertain to moving picture machine operators and stagehands.

1. The provision that the A. F. of L. minimum wage and maximum number of hours shall prevail takes effect where, in a community, any of your members were employed on August 23, 1933.

2. Where on August 23, 1933, you were receiving the same amount of money from each theatre, or all operators were receiving the same pay, there can be no difficulty and until the Code expires or is changed that is the minimum wage that can be paid to anybody performing those duties, whether a member or not, under the Code.

3. IN NO EVENT, HOWEVER, ARE OPERATORS OR STAGEHANDS ALLOWED TO WORK MORE THAN FORTY HOURS A WEEK. The limitation of hours of work to forty a week does not apply to maintenance men or to emergencies.

What Is Arbitrated and the Method of Procedure

1. REMEMBER THAT THE ONLY QUESTION BEFORE AN ARBITRATION BOARD IS WHAT WAS YOUR

MINIMUM WAGE AND YOUR MAXIMUM NUMBER OF HOURS FOR THE PARTICULAR CLASS OF THEATRES IN THAT LOCATION ON AUGUST 23, 1933.

2. Where you were working in a community or had a member or members working in a community and you had no set scale or scales, or where you had different prices for different theatres of the same classification, or where you were only partially organized, then the question of what was your minimum scale and maximum hours on August 23rd, 1933, is to be arbitrated. However, existing contracts must be lived up to by the Exhibitors, and you do not have to arbitrate such contracts.

3. If the dispute is only between your organization and the employer, then the I.A. office designates a representative to sit on the arbitration board. The employer designates a representative; and if the two persons so designated cannot agree on a third person, the National Recovery Administrator will designate a third person.

If the difficulty as to what was your prevailing wage scale and maximum number of hours on August 23rd, 1933 is between yourselves, the employer and strike-breakers or unaffiliated organizations, then the question of what was YOUR prevailing wage scale is arbitrated by a board of four: one selected by the I.A. office, one by the employer, and one by the non-union men or organization. If these men cannot agree on a fourth person, the National Recovery Administrator will appoint a fourth person.

4. If you are employed in a theatre now and you claim that you are not getting your minimum wage under the Code, or if the employer says unless you accept a reduction he will throw you out, the Code specifically prohibits either a strike or a lockout until after the question of what your minimum wage was for that particular class of theatres in that community is arbitrated.

However, prior to the time that the question of your minimum wage and maximum hours then in force are determined (provided, however, the hours provided for can in no event exceed forty), the Exhibitor cannot lower the amount of pay paid the men, nor increase the number of hours of work.

Once the arbitrators have decided what was the minimum wage on August 23rd, 1933 and the maximum number of hours of employment, then the prohibition against strikes or lockouts is removed.

You can strike for higher wages from that time on or for fewer working hours, but the employer in replacing you, if he does so, must pay the strike-breakers what the arbitration board determined was the minimum wage of August 23rd, 1933, and cannot work the men more hours than the arbitration board determined were your working hours on that date.

However, before any strike or lockout is started, an effort to mediate must be made. We suggest, therefore, that if you are threatened with a lockout, or if you determine to strike, you immediately communicate with our general office and ask that an I.A. officer be sent in for mediation purposes, and that you notify the employer using the following form of registered letter:

> "Gentlemen:
>
> In view of the provisions of Section 10, Act C, Part 1 of the Code of Fair Competition for the Motion Picture Industries, Exhibitors Division, we do hereby notify you that prior to our taking any steps to (a) prevent or protest against a lockout, or (b) strike in an effort to obtain fair wages and working conditions, that you or your representative and the undersigned should confer in an attempt to mediate such dispute.
>
> We hold ourselves in readiness at all times to fulfill all the terms of the Code and will attempt to mediate such disputes. I shall expect you also to attempt to do so immediately.
>
> This letter is sent you by registered mail in order to assure its safe and prompt delivery.
>
> Very truly yours,"

5. Should you desire arbitration we suggest the following registered letter be sent to the Exhibitor. Be sure to notify our general office immediately, sending copy of letters.

> "Dear Sir:
>
> In accordance with the provisions of Section C, Part 1, of the Code of Fair Competition for the Motion Picture Industry, Exhibitors Division, and because we claim you are paying wages lower than the minimum as of August 23rd, 1933, and before we go further with the matter, we desire that a hearing be held on this question.
>
> We have nominated Mr. ..... to act as our representative and request you to notify us immediately who you designate as your representative.
>
> Failing to hear from you by return mail, we shall be forced to take up this matter with the National Recovery Administrator.
>
> This letter is being sent you by registered mail in order to assure its safe and prompt delivery.
>
> Very truly yours,"

General Provisions

1. If at the present time you have a signed contract with a theatre to furnish operators or stagehands for more than forty hours per week for a set price, you will have to work out your contract and supply the additional men at no cost to the employer.

2. Section 7 provides that unless the employees agree, the work of the employees cannot be increased so as to decrease the number of employees employed.

Fraternally yours,
W. C. Elliott
INTERNATIONAL PRESIDENT

The immediate reaction out in the field to the I.A. statement, as reflected in the results of a canvass by this publication, was that it was a curiously involved and incomplete exposition of the code, and that in many particulars it was definitely contradictory. One such instance commonly referred to was the statement that " . . . existing contracts must be lived up to by the Exhibitors, and you do not have to arbitrate such contracts". Immediately preceding this statement is the injunction that " . . . in no event, however, are operators or stagehands allowed to work more than forty hours a week . . . "

The Elliott statement that "you can strike . . . . " is qualified in the paragraph immediately following by citing the "arbitration" provisions and in outlining the procedure to be followed. Outside of these obvious contradictions, however, the most glaring omission in this official "interpretation" is that referring to whether prevailing scale means *scale per man* or *scale per theatre*—which drags the burning question of manpower right out into the open.

Overage in Hours

Under the heading "General Provisions" is the clause which deals a death blow, as far as the official I.A. attitude is concerned, to any hopes for an adjustment on overages that might have been cherished by those men who are now working on jobs which run to more than 40 hours a week. Contract or no contract, this cost will have to be borne by the men, proclaims the Elliott statement, as follows:

> "If at the present time you have a signed contract with a theatre to furnish operators or stagehands for more than forty hours per week *for a set price*, you will have to work out your contract and supply the additional men *at no cost to the employer*." (Italics are ours.)

This interpretation of President Elliott is, of course, diametrically opposed to the stand taken by this publication on the question of who is to bear the burden of the overage in hours beyond the 40-hour maximum established by the code. In the section immediately following, as well as in the editorial page for this issue, appears pertinent information and comment anent this vitally important question.

61 Codes Oppose Picture Code on Overage Burden

DELUGED with inquiries and complaints from the field relative to the silence of the motion picture code with respect to the question as to who shall pay for the overage in hours beyond the 40-hour maximum set by the code, International Projectionist has concluded an exhaustive investigation into established NRA policy with respect to this question. The results of this work

(Continued on page 21, col. 3)

Smash the Vicious Overage Grab!

AN EDITORIAL

THAT interpretation of the motion picture code labor section which shifts the burden of the overage in hours to the backs of the workers is thoroughly vicious, is indicative of either gross stupidity or moral cowardice—and is directly contrary to the general policy of the NRA as expressed in the labor provisions of scores of codes for other industries.

Elsewhere in this issue appear the results of an exhaustive investigation conducted by *International Projectionist* into the labor provisions of 61 codes for major and minor industries. What worker in the motion picture field can read these results without a blush of shame?

For *not one* of these 61 industries has subjected its workers to such an outrageous injustice as that which apparently will be inflicted upon the motion picture worker through the medium of "interpretations" which hold that the cost of the hours of labor in excess of the 40-hour maximum established by the code shall be borne by the worker.

The question immediately arises: Why, out of 62 codes for all classes of industry, is the motion picture industry the *only one* which permits its workers to be socked in the jaw—and tries to force its workers to take that sock in the jaw lying down? We think we mentioned previously the possible answers: (1) stupidity, or (2) moral cowardice.

We say that the workers in the theatre field not only *do not* have to take this sock in the jaw lying down, but they *don't have to take it all.* For a number of reasons, among which are (1) the motion picture code is silent on this question, but this silence does not in itself validate any interpretation thus far placed on code language, whether by an individual, by an organization, or by the Deputy Administrator himself; (2) such an interpretation is absolutely opposed to both the well-advertised spirit and intent of the NRA and to the general practice of the NRA as expressed in the labor provisions for numerous other codes, including those 61 codes, citations from which appear elsewhere in this issue, and (3) such an interpretation can be tipped over very neatly and with comparatively little effort.

Imagine broadcasting to thousands of working men the message that they who now work more than 40 hours a week—whether 42, 44, 48 or, as in the many cases of stagehands, 52, 56 and 64 hours per week—just imagine telling these men that for every hour of work they lose until they reach the 40-hour limit, they will have to lose a proportionate amount of their wages! By way of illustration let's consider a projectionist or a stagehand who today works 52 hours a week and receives a wage of $52. To come within the limit of the picture code, as interpreted by the "best minds", this worker would have to part with $12 of his weekly wage, or a cut of 23%.

How's this for a nice little Xmas present? What an NRA this has turned out to be—spreading employment at the expense of the worker! This plan certainly was inspired—by whom or what we are unable to perceive.

Those who oppose this absurd ruling on overages need not think that they are alone in their stand. Any number of individuals and organizations—including Local No. 1, an I.A.T.S.E. stagehand affiliate in New York City—have rejected the labor provisions in toto and now have their faces definitely set against it.

The job ahead is to organize, or, rather, synchronize the protests which are bound to pile up against this ridiculous interpretation of the picture code labor clauses. *International Projectionist* recommends to those who are being made to suffer by reason of this preposterous interpretation—whether individual, group, or organization—that they *immediately* file a protest against this deal with their respective Regional Compliance Boards, and, *at the same time,* write or wire their protests to Administrator Hugh Johnson of the NRA at Washington, D. C.

Don't think you are standing alone in this fight. This is exactly what those who are trying to hoodwink you would like to have you believe. You are not alone—far from it. Scores of individuals and many organizations already have filed their protests against this overage in hours interprctation. Hundreds of other individuals and scores of other organizations will join in the fight tomorrow, or the next day. Let your protest go to swell the roar of those who refuse to stand idly by and be silenced merely by the braying of an ass.

Let your protest go to swell a tidal wave huge enough to sweep over and destroy those who would deprive you of the just fruits of your labor, won by years of worry and toil. *Do it now!*

For our part, we stand ready to serve you in any way possible. If you desire information on any phase of the motion picture code; if in doubt as to the correct method of procedure in any contingency; if you require references or citations from codes in other industries in order to guide you properly, or if you desire information relative to what other sections of the country are doing with respect to the question of overages in hours or *any other* code problem—the Code Department of *International Projectionist* stands ready to serve you.

Gratis, of course. Only gaudy fronts are expensive—and expansive.

Start swinging a theoretical baseball bat against those who would rob you of your rights—of your wages. And keep your eye on the ball. Pass along to us a report of your activities, and we'll use it to strengthen your hand.

Good luck!

JAMES J. FINN

I. P. Investigation Shows 61 Codes Follow Established Policy of the N. R. A. Relative to Burden of Costs for Reduction In Working Hours—Picture Code Alone is Silent On This Point

THE following citations from 61 codes submitted to and approved by President Roosevelt between July 9 and November 17, 1933, contain a general provision to the effect that the compensation for employment shall not be reduced even though hours of labor are reduced. Most expressive in outlining the established policy of the NRA with respect to the maintenance of wages, although higher than the minimum and even though the hours of labor are reduced, is the following excerpt from the Hotel Industry Code:

> "The weeky wage of all classes of employees receiving *more* than the minimum wages prescribed in this article shall not be reduced from the rates existing on June 15, 1933, because of any reduction in the number of working hours of such employees."

So far as this publication has been able to determine, the motion picture code is the *only* code which is silent on this question—although official "interpretations" have been issued by organized groups stating that the financial burden of the overage in hours beyond the 40-hour maximum shall be borne by the worker.

This list of citations is the result of an exhaustive investigation by INTERNATIONAL PROJECTIONIST into the question of who shall bear the cost of the such overages in hours beyond a code maximum, is copyrighted by this publication, and may not be reproduced without appropriate credit.

This listing gives first the name of the industry code, which is followed by the reference relating directly to the question of the maintenance of wages even though the hours of labor are reduced. These 61 code citations will be augmented by this publication as other codes are approved.

1. *Cotton Textile Industry*—Last Section: Amendment to Article XIII. Approved November 8, 1933.
2. *Shipbuilding & Ship Repairing Industry*—Article IV (b).
3. *Wool Textile Industry*—Article II. 3rd paragraph.
4. *Coat & Suit Industry*—5th Section—last paragraph, Caption, "Both Areas".
5. *Corset and Brassiere Industry*—Article 3 (b).
6. *Lumber and Timber Products Industry*—Administration Report of August 12, 1933, submitted by Dudley Cates, Asst. Administrator. Article III, Section 4, 8th paragraph.
7. *Petroleum Industry*—Article II, Section 3, last sentence of first paragraph.
8. *Legitimate Full Length Dramatic & Musical Theatrical*—The Administrative report to the President dated August 14, 1933, submitted by General Johnson, under the Caption, "The Code," second paragraph.
9. *Fishing Tackle Industry*—Article II, Section 3 (c).
10. *Mens Clothing Industry*—Article IV, 3rd paragraph.
11. *Hosiery Industry*—Article IV. Section 7, first two sentences.
12. *Rayon & Synthetic Yarn Industry*—Article V (b), 1st sentence.
13. *Leather Industry*—Article IV, Section 3.
14. *Motion Picture Laboratory*—Article IV, Section 3 (e), (Rates of Pay).
15. *Textile Bag Industry*—Article IV (d).
16. *Underwear and Allied Products*—Part II, 4 (b), 1st sentence.
17. *Bankers' Industry*—Article VI, Section 3.
18. *Motor Vehicle Retailing Trade*—Article III, B, Section 4, last sentence; Article II, B, Section 8.
19. *Building Supplies Trade*—Article IV, 1st paragraph.
20. *Farm Equipment Industry*—Article V. Section 2, C, whole paragraph.
21. *Luggage & Fancy Leather Goods*—Article IV, Section 3, whole paragraph.
22. *Ice Industry*—Article VI, 2nd sentence.
23. *Women's Belt Industry*—Article IV, Section 3, 2nd sentence.
24. *Mutual Savings Banks*—Article VI, Section 3, whole paragraph.

(Continued at foot of next page)

appear elsewhere in this code section.

The results of this investigation are startling. Every one of the 61 codes examined by staff workers for this publication to date reveals a general provision to the effect that there shall be no reduction in wages even though the hours of work are reduced. Some codes, notably that for the Hotel Industry, go a step further and provide that there shall be no cut in wages for a reduced working week *even though* the wages in effect on June 15, 1933, are *above the minimum* fixed by the code.

This interesting citation follows:

> "The weekly wages of all classes of employees receiving *more* (italics ours), than the minimum wages prescribed in this article shall not be reduced from the rates existing on June 15, 1933, because of any reduction in the number of working hours of such employees."

The motion picture code is silent on this point; although an official release from President Elliott of the I.A. advises all affiliated unions that the burden of such costs must be borne by the worker.

Relief Probable If Enough Protests Accumulate

Despite this official pronouncement from I.A. headquarters, evidences are not lacking that this feature of the code labor sections is in for a stormy passage. Advices from all over the country indicate that this matter will be made the basis of an immediate appeal to the various sectional and local Compliance Boards, provided the employers show no disposition to either willingly make an adjustment or submit the matter to arbitration. INTERNATIONAL PROJECTIONIST advocates editorially in this issue that a ruling be sought from sectional boards.

Unorganized projectionists appear to be hit hard by this interpretation of the code, and it is certain that not much time will elapse before such bodies, unhampered by organization rulings, will bring this whole matter of overages out into the open.

In view of the results of the investigation by this publication which accompany this article, in which 61 industry codes are shown to have definitely provided for an adjustment on the overage in hours, close observers of code operations are inclined to believe that the picture code in its present form cannot possibly stand up against the many protests which are expected to pour into NRA headquarters from all over the country.

The attempt of this publication to secure an official expression of opinion from the I.A. on this point proved unavailing. However, it was learned on good authority that the recent official

statement by President Elliott of the I.A. with respect to the overage question will not prevent many affiliated units from following through on either an arbitration proceeding or an appeal to sectional or local Compliance Boards.

Estimates of Costs

Various estimates of the cost to Local Unions of the recent interpretation of President Elliott on the question of hour overages range all the way from one to two millions of dollars during the coming year. Just two locals—No. 1 of New York City (stagehands), and No. 182 of Boston (operators)—stand to lose jointly some $200,000, with $125,000 being the loss of the former. Incidentally, both of these locals are involved in interesting developments growing out of I.A. approval of the code.

First, Local 1 is reported to have sent a wire to the I.A. in which they put their membership on record as being *unanimously* opposed to the code in its present form. Confidential advices reaching this publication from Washington reveal that Boston Local 182, trusting not in God nor in official interpretations, has already moved to protect its membership by seeking an exception from the NRA on the question of the overage in hours. The basis of the Boston appeal is the fact that they have no unemployed members with which to take up the slack occasioned by conformity with the maximum hour provision.

A direct inquiry to Boston Local 182 headquarters for detailed information anent their current code activities met with the answer that they did not care to make any comment at this time. It is significant, however, that the question posed as to their code activities met with no denial.

Impartial outside observers, including several lawyers who have participated in the formulation of many codes, are of the opinion that the silence of the picture code with respect to the overage question is directly opposed to the plain intent and general policy of the NRA. Not only that, said one noted attorney in Washington, but it seemed to him a certainty that an effective protest on this point by bodies all over the country would result in an order correcting this situation.

I. P. Code Bureau

As announced elsewhere in this section, INTERNATIONAL PROJECTIONIST has established a Code Department, manned by competent workers and having available legal advisors, which solicits and will be glad to answer to the best of its ability any question on any phase of the motion picture code which may be submitted by its readers. This service, already in operation for two weeks, will be absolutely confidential in character, and will extend its facilities to any individual or group or body, irrespective of classification.

Following the release by President Elliott of the official I.A. interpretations of code language, there no longer exists any doubt that strikes are banned by the code. In fact, the I.A. release includes suggested forms for opening arbitration proceedings. Also, there is no longer any doubt that local autonomy is a thing of the past under that section of the code which delegates the power of the appointment of an arbitrator to the I.A. President, instead of placing it in the hands of the officers of the Local Union affected.

Of course, local autonomy no longer exists anyhow, in view of the action of the I.A. General Executive Board in Washington, which suspended local autonomy. This action is not generally known throughout the I.A.

61 Code Citations on Overages

(Continued from preceding page)

25. *Handkerchief Industry*—Article IV, Section 5, last sentence.
26. *Throwing Industry*—Section 2 (c), last sentence.
27. *Umbrella Industry*—Article IV, Section 5, 1st sentence.
28. *Retail Trade*—Article VI, Section 5, whole paragraph.
29. *Marking Devices Industry*—Article IV, Section 4. whole paragraph.
30. *Industrial Supplies & Machinery Distributors*—Article IV, Section 6, whole paragraph.
31. *Motor Bus Industry*—Article IV, Section 2, whole paragraph.
32. *Road Machinery Manufacturing*—Article V, Section 2 (c).
33. *Packaging Machinery Industry and Trade*—Article VII, Section 1, E.
34. *Advertising Specialty Manufacturing*—Article IV (e).
35. *Dress Manufacturing Industry*—Article IV, Section 9, 1st sentence.
36. *Canning & Packing Machinery*—Article V (c).
37. *Rock Crusher Manufacturing*—Article VI (c).
38. *Beet Sugar Industry*—Article IV, 2nd paragraph, 1st sentence.
39. *Terra Cotta Industry*—Article III, Section 3.
40. *Asbestos Industry*—Article IV, Section 5.
41. *Stock Exchange Firms*—Article II, E.
42. *Office Equipment*—Section 15.
43. *Crown Manufacturing Industry*—Article III, Section 6.
44. *Toy and Plaything Industry*—Article IV, Section 3.
45. *Asphalt Shingle & Roofing Industry*—Article III, Section 4, 1st sentence.
46. *Piano Manufacturing Industry*—Article IV, Section 4, 1st sentence.
47. *Men's Garter, Suspender, & Belt Manufacturing*—Article III, Section 6.
48. *Funeral Supply Industry*—Article IV, Section 6.
49. *Novelty Curtain, Draperies, Bedspreads and Novelty Pillows*—Article IV, Section 3.
50. *Buffing & Polishing Composition Industry*—Article IV, Section 3 (c).
51. *Shovel, Dragline & Crane Industry*—Article IV (c).
52. *Printers' Rollers Industry*—Article IV, Section 1 (c).
53. *Cleaning and Dyeing Trade*—Article IV, Section 6.
54. *Crushed Stone, Sand and Gravel and Slag Industry*—Article IV, E.
55. *Hardwood Distillation Industry*—Article IV, Section 6.
56. *Air Transport Industry*—Article IV, Section 3.
57. *Mopstick Industry*—Article IV, Section 4.
58. *Wood Plug Industry*—Article IV, Section 6.
59. *Retail Food & Grocery Trade*—Article VI, Section 7.
60. *Wholesale Food & Grocery Trade*—Article VI, Section 7.
61. *Hotel Industry*—Article VI, Section 5.

Use the Code Department of INTERNATIONAL PROJECTIONIST. Its services, free to readers, are absolutely confidential in character and are extended irrespective of classification to any individual, group or organization.

Sherman Forces Sweep 306 Election

ELECTING every one of their candidates—25 men in all—for offices ranging from vice-president to sick committee members, the Sherman forces swept into office on an overwhelming vote in the recent Local 306 (N. Y. City projectionists) election, the first general election since the removal of the Kaplan group last December by the I.A. Harry Sherman's office was not involved in the election, his term as president having until December 31, 1935, to run.

The Sherman group completely dominated the balloting, averaging 918 votes for their entire slate out of a posible 1,400 votes. Their nearest opposing ticket averaged 206 votes. The Kaplan ticket netted a miserable average of about 160 votes per candidate.

This sweeping endorsement of Sherman's leadership of 306 was the result of an all-day election in which voting machines were used for the first time in the history of L.U. 306 elections.

FIGURE 3

Immediately following the final news clip, the revolving globe was again faded in for the finale

PROJECTION SHOWMANSHIP BY HARRY RUBIN

THAT rarity in the theatre field—real showmanship in projection work—was on view recently at the New York Paramount Theatre as a result of some intelligent planning and precise projection work by Harry Rubin, director of projection for Publix Theatres. Utilizing the magnascope screen, which Rubin perfected several years ago, this demonstration was significant in emphasizing the great value of showmanship in projection.

Technically, the effect may be described as follows: An aperture blank (of the brass plate, slip-in type), is field out to a circle having a diameter of .600 inch, the full height of the standard aperture, and is inserted in the projector.

On the stereopticon, or effect projector, is placed an effect on which are several colored representations of two continents. This effect, having a circular opening which is registered on the screen with the circular aperture of the projector, gives a realistic illusion of the world rotating on its axis. On a second lamp, or effect projector, is placed a cloud effect so arranged as to cover the entire magnascope screen, except that center portion covered by the rotating globe effect. This is accomplished by opaquing the center of a slide cover-glass and placing same in a fixed position in front of the cloud effect.

From a second effect projector, or stereo, is projected an effect-design to cover the entire magnascope with the exception of that portion covered by the moving world and the circular aperture of the projector (which are in register, as previously explained). The center of the effect-design is opaqued, and the opaqued circle is placed in register with the circular projection aperture.

In putting on this effect, the screen is opened to full magnascope proportions (44 feet wide), and the rotating globe and the cloud effect are projected simultaneously (Fig. 1). After several seconds the news weekly is projected in register with the moving globe, the main titles and the titles of the first news clip being superimposed on the rotating globe. As the first scene of the news appears, the rotating globe and the cloud effects are dissolved into the effect design, gorgeously colored, having the opaqued center (Fig. 2).

This effect design remains on the screen as a background for the news subjects, which are projected in oval picture form, of course. This design is held on the screen until the End Title of the news is reached, at which point the rotating globe is again faded on, fitting into the opaqued center of the design and superimposed on the End Title (Fig. 3). As the curtains are closed the film and effects are faded off.

Tribute to Harry Rubin

Not only is no significant action lost by the oval picture which is projected, but on the several occasions when this writer viewed the effect he heard many expressions of pleasurable surprise among the audience. Incidentally, there is some potent attracting force exerted by an oval picture, as compared with the conventional square picture, a fact which is well recognized in advanced advertising circles.

Close attention to the many details and exact timing are absolutely necessary for good results in putting on this or any similar effect. The size of the

(Continued at foot of next page)

FIGURE 1

Opening scene of Rubin effect. Moving cloud magnascope effect, with revolving globe inset in circular center portion. Opening titles of news superimposed on the rotating globe. succeeded by effect shown in Figure 2

FIGURE 2

Brilliantly colored effect replaces opening cloud effect, and revolving globe is faded off to make room for the oval picture which was projected in center piece. This effect held throughout the news projection

THE NEW STRONG A. C. LAMP

ENGINEERING DEPARTMENT, STRONG ELECTRIC CORPORATION

TO meet the demand for more light at reduced operating costs, the Strong Electric Corp. has designed the new Mogul A.C. Automatic Reflector arc lamp. This lamp is intermediate in both light intensity and operating costs between the low-intensity and the hi-low arcs. It has been specially designed to meet the needs of the medium-sized theatres which are now using low-intensity arcs but which require more light and where the operating costs of a hi-low lamp would be prohibitive.

Surprisingly low operating costs are a distinct feature of this new A.C. lamp, the overall cost of current and carbons being slightly lower than with present arcs using 30 amperes, notwithstanding that this new A.C. lamp projects twice as much light. The projected light should satisfy even the most critical projectionist, being a brilliant white with just a tinge of blue which gives a realistic daylight effect to the projected picture and easily penetrates even the darkest film.

The optical system comprises an accurately formed, optically-corrected elliptical reflector 10¼ inches in diameter, which projects a colorless flat field of crisp, white light. The reflector is protected from damage during the arc-striking operation by an auxiliary dowser which is automatically lifted when the change-over dowser is opened.

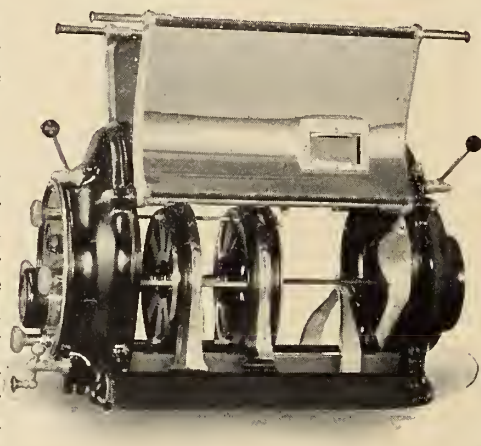
Numerous Refinements

Refinements of construction are numerous. Moving parts are sealed everywhere against the dust and dirt from the arc. Unit construction permits complete dismantling or assembling of the lamp in a few minutes. The quick focussing arrangement is particularly convenient and operates with only a touch of the finger. The lamp is provided with six ball bearings and a dozen maganese bronze sleeve bearings, assuring perfect alignment indefinitely. The lamp also has an inside inter-connected mirror dowser and change-over dowser system, a carbon setter, an ammeter, arc imager, ash receiver, spot pre-aligner, automatic pilot and framing light, safety clutch, and the Strong electrically-balanced arc control system.

The Strong Electric Corp., in co-operation with this publication will gladly answer, either directly or through these columns, any question relative to any phase of the design, construction or operation of this new A. C. lamp. Inquiries may be addressed either to the Strong Co. in Toledo or to this publication.—Editor.

The arc control system is balanced to give a smooth, positive regulation of the arc, feeding the carbons automatically and continuously at exactly the rate they are consumed. The control is a separate and independent unit, and is built to appear as an integral part of the lamphouse. However, it may be removed as a complete unit assembly.

The Strong inductor is a highly efficient, adjustable, self-regulating transformer, and is the only equipment required in addition to the lamps. It is used to step-down the 220-volt line current to 25 volts for use directly into the arc. The inductor has no moving parts and thus operates without noise. There are no tubes to replace, nor brushes or batteries to wear out, nor ballast resistors to waste electricity.



View of lamphouse interior on new Strong A.C. Mogul lamp

The carbons used are 8 mm. X 12-inch National copper-coated, high-intensity, A.C. projector carbons. These carbons burn best at 80 amperes and 25 volts; but if less light is needed, the 7 mm. carbon may be used at 65 amperes, with a corresponding saving in both current and carbon costs. Both front and back carbons are alike and, burn in a horizontal position without rotation—which results in a very minimum of carbon waste. When burning at their rated capacity, these carbons are consumed at the rate of only 4½ inches per hour.

A. C. Arc Theory

The theory of the alternating current arc is that certain chemicals which are added to the core metal of the carbon are carburated when subjected to the heat of the arc, and the gas thus formed at the tip of the carbons becomes intensly luminous as the electric current flows through it. This brilliancy is maintained irrespective of the direction of the current flow through the gas, so that a steady light source is possible even with alternating current.

Modernly styled, this new Strong lamp —to be known as the A.C. Mogul—is ruggedly designed, light-tight and well ventilated. The lamphouse doors and top are of natural blued rust-resisting steel, double-walled and lined with asbestos. The ends are of cast aluminum, finished in dull black heat-resisting enamel. The base is of welded steel channels, forming a rigid support for the burner mechanism.

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magnascope screen was 44 feet wide, while the size of the projected oval picture image was 19 feet in diameter.

It is interesting to note that this effect was not the product of any art department or effect slide manufacturer, having been conceived, designed and executed in its every detail by Harry Rubin. As an example of splendid showmanship in effect work, and in emphasizing the many ways in which the conventional projection room equipment may be utilized to dress up a program, this particular effect has never been equalled. Practically the same equipment as was used in this demonstration stands in countless projection rooms throughout the world, but apparently only a very few projectionists are aware of its possibilities or are willing to devote the time necessary to thinking out a special effect, such as Harry Rubin did and does on any number of occasions.

With this effect Harry Rubin once more proved his right to be recognized as the foremost projection effect man in the field, an honor which has been his for many years. Rubin is chairman of the Projection Practice Committee of the S.M.P.E., chairman of the Technical Coordination Committee of the Projection Advisory Council, and a member of Local 306, I.A.T.S.E.—James J. Finn.

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The industry's guide to the short subject field.

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Amperex Shows Two New Sound Tube Types

AMPEREX Electronic Products has introduced two new sound picture tube types that are winning favor in the field—the Amperex 205-D, new in every respect, and the greatly improved Amperex 264-B.

The demands made on the 205-D are by far more severe than that of any other similar tube. The same tube is expected to operate asa rectifier (as was the custom, in 1920), as an amplifier, and as an oscillator. The plate dissipation in this tube is also respectively higher than in other tubes. To overcome all these difficulties, Amperex set about designing a tube with the following characteristics:

1. *Long Life*—It is neither feasible nor economical to have tubes fail during performance. Definite life expectancy should be assured.
2. *Uniform Characteristics*—All 205-D tubes used as amplifiers in motion picture sound equipment are in push-pull circuits, which requires that they be carefully matched.
3. *No Output Hum*—In some sound equipments the 205-D is followed by a high-gain amplifier, so that any variation in filament temperature (filament is invariably A.C.-operated) would be noticeable in the output.
4. *No Arcing Between Electrodes*—High insulation should exist between electrodes, so that even at the highest potentials no arcing will occur.
5. *High Efficiency*—The large effective plate area and the efficient filament insure high mutual conductance.
6. *Fast Pick-up and Constant Uniform Speed in Control Boxes*—Automatically operated change-over equipments depend upon the efficient operation of the 205-D.
7. *Rigidity in Construction*—Continuous vibration in projection rooms, daily handling for test purposes, as well as unavoidable shipment of single tubes, necessitates a construction which will not permit dislocation of the electrodes with respect to each other.

Greatly Improved 205-D

In the new Amperex 205-D long life has been insured by the use of a special alloy filament, carefully coated and properly life-tested before its final adaptation. The important characteristics of this new tube will not substantially vary even at extremely varied voltages encountered.

The relatively small quantities of 205-D's used permit manufacture and test of them under laboratory conditions. The material for the electrodes is subjected to chemical tests before use and special equipment has been designed to insure proper alignment of the various electrodes.

To overcome the arcing between the electrodes, the high-voltage plate lead has not been incorporated in the press as is usually the custom, but is placed at a distance of almost a half inch from the grid lead in the side of the flare. Special precaution has been taken (by placing deflectors on the press), so that no metallic vapors could deposit between the elements.

The filament has been so arranged within the structure that the entire plate area is effective. The same factors which insure long life, automatically give optimum efficiency. One hundred percent of the filament area is emitting, so that there is very little change in the electrical characteristic of the tube from a relatively low to a relatively high filament voltage. Fast pickup as well as constant uniform speed during operation, which is entirely dependent on uniformity of electrical characteristics and holding closely to a standard characteristic, is insured by dynamic as well as static tests.

Rigid structure is assured by using a four-point support.

The Amperex 264-B

The other improved tube type is the Amperex 264-B, the characteristic use of which has imposed certain demands of which the most important is absolute freedom from noise. A constant source of great annoyance with this type tube has been the corrosion occurring at the point of contact of the tube socket with the base prong, resulting in noise. It has been found that this difficulty could be overcome by plating the tube prongs with a semi-noble metal that will prevent corrosion.

The Amperex 264-B retains all the characteristics of the 264-A type, particularly the low microphonic response, and has in addition the silver plated prongs to give additional assurance that it will not become noisy from corrosion during operation. Obviously, this new 264-B tube is fully interchangeable with the older type 264-A tube.

Both these new tube types are now available in unrestricted quantities.

NOTES *from the* SUPPLY FIELD

★

SYNCROFILM CARBON SAVER

THE Syncrofilm Carbon Saver developed by the Weber Machine Corp., makers of the well-known sound reproducing system of the same name, is now ready for distribution in the projection field. This Saver, reports the Weber company, is not a gadget but an accurately machined equipment which has been designed by practical projectionists. The Saver is easy to operate, and results in no fuss or dirt.

The complete Syncrofilm Saver outfit consists of 1 frame for drills, 3 positive and 2 negative adapter rods, 2 drills with handles, 12 extra points for adapters, 1 dust cup, and 1 bushing for drilling the negative carbon. Price for the complete outfit is $20. The manufacturer is located at 59 Rutter St., Rochester, N. Y.

L. U. 640 ELECTIONS

Officers elected at the last meeting of I.A. Local 640 (Nassau and Suffolk counties, L. I., N. Y.) are: Joseph Engle, pres.; M. D. O'Brien, v.p.; Rodney Titcomb, rec. sec.; Dave Peshkin, fin. sec.; and Frank Cummings, b.a.

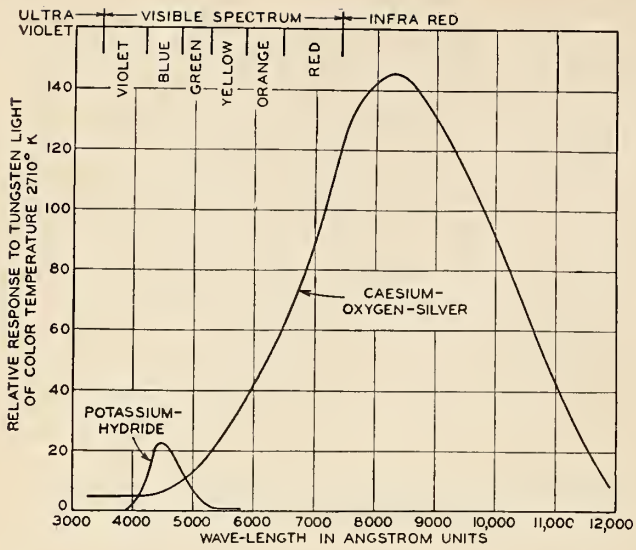
THE CAESIUM—OXYGEN—SILVER PHOTOELECTRIC CELL

M. J. Kelly

MEMBER, TECHNICAL STAFF, BELL TELEPHONE LABORATORIES

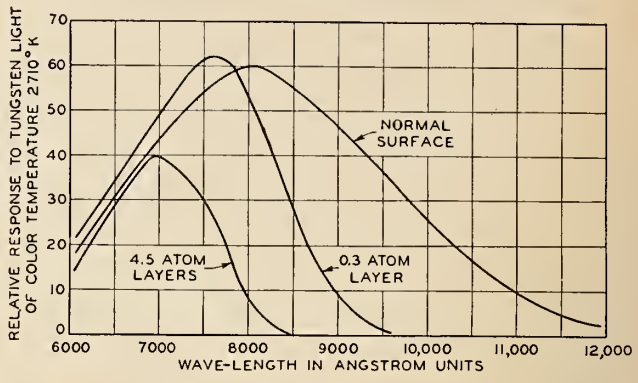
DURING the past three years the photoelectric cells of the potassium-hydride-cathode type have been replaced by cells employing a new and more highly efficient cathode. This cathode has a core or base of pure silver upon which is formed a matrix of caesium oxide, silver oxide, and finely divided silver. This matrix is covered by an absorbed layer of caesium of atomic dimensions and in equilibrium with a small amount of strongly absorbed free caesium in the matrix.

With an incandescent lamp as a light source, as is used in sound-picture and picture transmission systems, this cathode is more than fifty times as sensitive as is the potassium-hydride-cathode



(Left) FIG. 1—P.E. characteristics of potassium-hydride and caesium-oxygen-silver cells

(Below) FIG. 2—Effects on the photoelectric sensitivity of various thicknesses of the outer layer of caesium



previously used. The relative response of the two types of cathodes to tungsten light of color temperature 2710° K over the spectral range from 3,000 to 11,000 Angstrom units is given in Figure 1.

To obtain a highly sensitive cathode surface, and one whose long wave-length limit extends so far into the infra-red, it is very essential that the residuum of caesium in excess of that necessary to combine with the silver oxide be held within extremely close limits. Studies have been made of the effect of additional amounts of caesium on the photosensitivity of the surface. In these studies the spectral response of a normally prepared surface has been obtained, and then additional caesium allowed to condense on the cathode surface at such a slow rate that the change in sensitivity of the surface with added caesium coverage could be observed.

Effect of Added Caesium

Typical results of this kind are shown in Figure 2. From this figure it can be seen that the long wave-length limit recedes from about 12,000 A. to 9,600 A. by the addition of about 0.3 layer of caesium. When 4.5 layers have been added to the surface, the long wave-length limit has receded further to 8,400 A. The integrated area under each curve is proportional to the total sensitivity for that surface condition. For 0.3 of an atom layer added, the total sensitivity is reduced to 60% of its initial value, and for 4.5 layers it is further reduced to 25% of its initial value.

The 3A type photoelectric cell has been standardized for sound picture applications. Its cathode is of the caesium-oxygen-silver type. A still higher output is desired from this cell than the increased sensitivity of its cathode makes possible. To further increase the sensitivity, the cell is filled with argon to a pressure of a few hundredths of a millimeter of mercury. With anode potentials of less than 20 volts the behavior of the cell is identical with the high vacuum one. For anode potentials greater than 20 volts the anode current rises above that of the vacuum cell and diverges rapidly from it. At 90 volts potential the anode current is approxi-

mately three times the vacuum value. This increase is due to ionization of the argon by the photoelectrons emitted from the cathode. A three-fold amplification of the cathode sensitivity is thus obtained by gas ionization.

If the anode potential is increased to approximately 150 volts, the anode current will vary in a discontinuous manner and will no longer be directly proportional to the intensity of the light. It is necessary to operate the cell with anode potentials well below this unstable condition, and ninety volts is the value usually chosen.

The A. S. C. Asks Direct A. F. L. Charter

The American Society of Cinematographers, heretofore advertised as a strictly technical and educational organization of cameramen, much like the American Projection Society in its field, has applied to the A. F. of L. for a direct charter, over the head of Local 659, I.A.T.S.E. unit. No formal statement of position has been issued by the I.A.T.S.E. as yet.

For several years now these two West Coast organizations have been at loggerheads, although many members of Local 659 are identified with the A.S.C. It was noted that several members of the latter organization were "drafted" for appearances at the Washington code hearings in support of the producers' stand against certain demands of Local 659, particularly with reference to the replacement of first cameramen and the general splitting up of work.

SOME UNOCCUPIED MOTION PICTURE FIELDS

William H. Short

DIRECTOR, MOTION PICTURE RESEARCH COUNCIL

FOREWORD: *When the accompanying paper was originally presented as a paper before the S.M.P.E. it aroused widespread critical comment within the industry, the bulk of which was distinctly unfavorable. Additional significance has been lent to this paper by the recent appointment to the Code Authority of President Lawrence A. Lowell of Harvard University, who is also chairman of the Motion Picture Research Council, sponsors of the work reviewed in the accompanying article—Editor.*

THE Motion Picture Research Council is a body of more than three hundred men and women, widely distributed geographically, and somewhat equally divided between the three allied groups of social workers, social scientists, and socially minded lay men and women. Miss Jane Addams of Hull House (Chicago, Ill.) is dean of our social workers group. The Chairman of the Council is Dr. John Grier Hibben, President Emeritus of Princeton University.†

The purpose of the Council, organized five and a half years ago, has from the first been definitely and positively constructive, and friendly to the motion picture art. All were convinced at the beginning both that the motion picture is here to stay and that it is potentially a tremendous boon to the human race. For these reasons, the social workers felt the need, as an equipment for dealing with motion picture problems, for a broad fund of scientifically obtained information regarding the potentialities and actualities of motion pictures, es-

†Since deceased, and succeeded by Pres. A. Lawrence Lowell of Harvard University.

Preparations are reported under way on the West Coast to revive interest in the double-reel standard sponsored last year by the Academy. Unquestionably we should have had this question up for determination before now were it not for the fact that the Academy ran into some very stormy weather on its own.

In any event, we repeat our previous warning: 1700-foot reels are *not* double reels and will not serve to stop the practice of doubling. If this tentative standard footage is to be increased, serious consideration must be given to the safety factors involved. And by "safety" we mean protection for everybody—projectionists as well as audiences.

pecially in relation to childhood and youth. Miss Addams said that she had been serving on motion picture committees for a generation, and that little or no progress had been made just because such knowledge was not available.

The social science group was impressed with the fact that in the motion picture art we have a new and major tool of civilization for the social use and guidance of which their fraternity has an especial responsibility. Dr. Mitchell early gave expression to this conviction in the following words:

> Motion Pictures are one of the most powerful influences in the "making of mind" at the present time. They affect great masses of people, and they affect those masses during the impressionable years of childhood and youth. The industry has developed on a strictly commercial basis into one of our most conspicuous branches of business, demonstrating that moving pictures meet an intensely felt interest. So far the only social guidance which has been exercised has been of the negative sort—a censorship designed to remove objectionable features. Constructive guidance has been notably slight.
>
> Obviously the moving pictures are doing things to our thoughts and feelings. It is high time we discovered what those things really are. There is no problem that could be of greater concern to those who are interested in the quality of our future citizens.

The lay group of the Council shares both the scientific and the citizenship interests of the other two groups. Together they present a united front of interest and desire to serve in the devel-

TEXAS INITIATIVE

C. K. Peters, Jr., secretary of I.A. Local Union 548, in Paris, Texas, has been named secretary-treasurer of his local Better Business Club, an organization formed to promote the business interests of Paris. . . . Seems like not a bad way to gain a bit more favor for one's organization.

R. C. A. SALES CONVENTION

RCA Victor Photophone sales representatives from coast-to-coast gathered at the Camden headquarters of the company for a two-day sales convention, beginning December 19.

E. O. Heyl, Manager of the Photophone Division, opened the sessions with an address, followed by round table discussions and other addresses. The whole party entrained for New York after the meetings to visit the new NBC studios and the two Radio City theatres where they inspected the elaborate Photophone High Fidelity sound systems installed at these de-luxers.

The growing enthusiasm among exhibitors relative to the RCA sales policy was reported to the gathering.

opment of the new motion picture art in the broadest and most socially useful ways.

The Council does not oppose censorship, but does believe that the time has come for something other and better than that. It was in this faith that it had its origin and is doing its work. The ultimate and constructive aim of the Council, has, from the beginning, been to develop a plan and recommendations for the motion picture art, as broad and scientifically helpful in every respect as, through four centuries of use, the art of printing has become. And then to devise and stimulate leadership that will enable the motion picture art to achieve this high and honorable destiny.

Payne Fund Research

But the Council thought that *it ought first, by careful and patient research, to find out whether it was correct in the belief that in the motion picture art civilization has a new tool of high intellectual and social potency.* It, therefore, invited and received the assistance of the Payne fund, an agency "interested in enterprises connected with the radio, motion pictures, and reading in their relations to the education of children and youth". The Payne fund, in turn, organized an Educational Research Committee of qualified psychologists and sociologists from the social science faculties of the universities of Chicago, Iowa State, Ohio State, New York, Columbia, Yale, and Pennsylvania State College.

A program of research was developed by prolonged conference of social workers and the members of this Educational Research Committee; budgets were drawn; the required funds were deposited with university treasurers; and the several research men went to work, under a commission without fear or favor to get the facts in their respective sectors of this broad field, and to pursue their research until amply abundant data had been accumulated to substantiate the conclusions at which they might arrive.

For four years, without interference by publicity or otherwise—yet cooperatively—the research went on. Under the guidance of Dr. W. W. Charters the research guns were kept on the targets. Findings have been obtained that, with unimportant exceptions, fit together like the parts of a well-planned structure to make a body of scientifically obtained data which, taken together, has still greater validity than does any one of its workmanlike parts. The Macmillan Company has published the findings in nine scientific volumes and one summary volume. The summary volume, in popular language, is by Henry James Forman.

Let me summarize in the briefest possible way, just a few of these findings, and state some important conclusions to which, in my own judgment, they point. In due time, as I have already said, the Council itself will make and publish its well-considered conclusions and recommendations.

Child Receptivity

(1) *Child Receptivity to Movie Ideas.*—Even very young children *take in,* to a remarkable degree, what they see on the screen. Second- and third-grade children (7 to 9 years of age) take in 60 per cent of what a group of young college professors, graduate students, and their wives take in; and the percentage of retention increases rapidly as the children become older. This goes with every class of ideas; and in the case of both *general information* only incidentally connected with the film story, and the *specific content* of the story—there isn't much difference between the two.

It has been generally supposed that many classes of ideas in the films go

quite over the heads of children. Well they don't; they all register to a significant though not identical degree, even with the second graders. They remember best such things as sports, crimes, acts of violence, general action, humor—anything that appeals to the emotions. The child who is quite unable to give you a connected story about the film can and does, when appropriate ways of testing are used, show that his intellectual takings-in have been of such inclusive sort and high percentages as I have just stated. Just as the very young child who could not give you a dozen connected sentences, either verbally or on paper, of what he has seen in his own home, has nevertheless acquainted himself there with a thousand folk ways and learned the rudiments of speech, so does he take in and store away the promiscuous contents of the films.

(2) *Remembering.*—Do children remember what they see in the movies, or is it in mind today and gone tomorrow? Here the investigators were slated for much the biggest surprise of the research. The classic investigation previously made to find out how long children remember what they learn from books had shown only about 30 per cent retention after the lapse of a month.

Lasting Impressions Formed

These experiments with the films show that at the end of a month the child recalls nearly or quite, 100 per cent of what he knew in the morning after seeing the picture, and not infrequently *more* than 100 per cent—sometimes as much as 110 per cent. After six weeks the average retention was still 90 per cent, and after three months practically the same—sometimes even more. The second grade children beat the professors at remembering.

The only explanation for this lasting impression seems to be that the impact made by the films is of a different sort from that made by books—a dramatic, emotional impression, akin to a vivid experience. You and I, at this moment—even though in middle life or beyond—can recall with vividness and complete detail, certain dramatic occurrences of childhood days; we couldn't forget them if we lived a thousand years. Well, the movie recollections of children are of the same order—visual, dramatic, sometimes poignant *experiences.* As about 3,000 persons of varying ages were studied in this memory investigation, by means of 20,000 testings and 813,000 items attempted, the findings reported may safely be accepted as established.

Emotional Stresses

(3) *Emotional Stresses.*—In addition to intellects which take in and remember, we also have an equipment of emotions. Any one who has seen mature men and women laughing and weeping over an imaginary screen story does not need other proof that the motion picture is a peculiarly effective instrument of emotional appeal. If, besides, he has been on a Saturday or Sunday afternoon within earshot of a theatre that was showing a Western serial to a house full of children, he will have reason to suspect the children are at least not less affected emotionally than adults.

Well, he will be quite right about it. Exhaustive experiments were made by recognized experts. These were carried

on both in the laboratory and under regular theatrical conditions. Children and adults were used, boys and men, girls and women. Some six thousand four hundred readings were made with a psychogalvanometer, two thousand one hundred fifty of them in the movie theatre. Heart-beat was also counted by appropriate mechanical devices.

What was learned? Briefly, that in the case of slapstick stuff, adolescents are roughly under twice as much emotional intensity as adults; and young children, between six and eleven years, three times as much. No horror or mystery pictures were used in the experiment, yet, in certain scenes, young children registered from eight to ten times the emotional intensity of the adults. The adult has had experience that enables him to say to himself, "That isn't real; that isn't true." To the child, what he sees is both real and true.

In the cases of love scenes and those of suggestive sex, children nine years of age appeared to react with about the same intensiveness as adults. From twelve to fifteen, all children reacted to a still greater degree. During the years following puberty—sixteen to eighteen years of age—the emotional stresses caused by sex pictures are at their maximum—twice as great as is experienced by adults. And that is considerable.

The rate of heart beat was found to be profoundly affected. The experimenters did not venture to use pictures of horror or mystery in any of their experiments with children—only those of quite common variety. Yet, in watching these, the heart beat ran up repeatedly from a normal of 75 or 80 to 125 and 140. Using *The Mysterious Dr. Fu Manchu*, the heart beat of a mature woman, selected for her normal and equable temperament, jumped up frequently to 150 and 168 and on single occasions to 180 and 192.

Sleep Disturbance Studies

Study of sleep disturbance was also made throughout a two and one-half year period, during which the sleep motility of 170 boys and girls from six to eighteen years of age was observed. Twenty experimental beds were electrically equipped so that every movement was recorded in a distant room on revolving drums of paper. These beds were occupied on 347 nights—a total of 6,650 child-nights of sleep—that is, for 59,580 hours.

The records of movements during every minute of that time were carefully studied. It was found that after attending the "mine run" of movies at a neighboring theatre, so situated that the children could be home and in bed by nine o'clock, the average restlessness of girls was increased 14 per cent and that of boys 26 per cent. This restlessness continued for several nights before normal sleep was restored. No mystery or horror pictures were seen during the sleep study. But numerous instances are recorded by other observers in which such films resulted in broken sleep and frightful nightmares for weeks and even months.

There were, as you see, three separate and distinct tests of emotional stresses experienced by children. There were direct objective measurement by means of the psychogalvanometer; indirect objective measurement by observation of the heart-beat; objective measurement of resulting sleep disturbance by the electric hypnograph. These, both separately and collectively, indicate the presence in children of states of high emotional excitement as the result of movie attendance.

(4) *Attitude Studies.*—These had to do with the effectiveness of motion pictures as an instrument for changing the social attitudes of children in either socially approved or socially disapproved directions. An attitude is a habitual, or relatively fixed, emotional response to a given idea or situation. It was found that with a single film the attitude could be changed much as the line of mer-

cury is run up or down in a thermometer by the application of heat or cold; and that two or three films of a similar theme were much more effective than one.

Sons of the Gods, a film that shows the Chinese in a favorable light, made a whole townfull of children much more favorable to the Chinese than they were before, while Harold Lloyd's *Welcome Danger* carried Chinese stock, already low, to a still lower level. *Birth of a Nation* resulted disastrously to the standing of the negro among the children of the Illinois town where it was shown. The pro-negro film *Hallelujah*, if it had been used, might have moved popular sentiment toward the negro equally far in the other direction. Extensive tests made with films on different subjects thoroughly established the effectiveness of the film as an instrument of propaganda, even though it was not so intended by the producer.

An effort to measure the *total* influence on children of the hundreds of thousands of films they had seen was not very successful. In view of the conglomerate and conflicting nature of film content it was a heroic undertaking at best. But quite aside from that, the reasons for its comparative failure are easy to see as one looks back upon it. The proposal was to discover and measure the differences between a group of non-movie-going children and an equated group of movie goers. No group of children unaffected by movie attendance and environment could be found. So, a group who went infrequently had to be compared with one that went more often; that was not convincing. In the second place, the technic used was lacking in sensitiveness when compared with the technic used in determining the influence of a single film. Finally, it could not be determined by the technic whether the effects discovered were the result of selection or of movie-going.

The failure of the study does not, of course, cast any doubts on the validity of the results of the other experiments that did successfully measure the changes in attitude caused by single films, or by groups of two or three films of like theme. It has been completely established that the film is a highly effective instrument for changing the social attitudes in great masses of people, and in either socially approved or disapproved directions.

Behavior Patterns

(5) *Behavior.*—The study of behavior patterns and conduct, as molded by the films, was so extensive that I can not attempt here to give even the slightest summary. It shows that the movie theatre is an educational system, a school of conduct—it may be desirable conduct, in socially helpful directions; it may be objectionable conduct leading to vulgarity, delinquency and crime. What the young child sees on the screen he accepts with much the same trustfulness that the fledgling in the nest displays in accepting food from the mother bird. A South American gentleman of education and culture, who had been several times in the eastern United States, said to a North American friend that in the visit he was then about to make he would land at a California port and see "wildwest." What this gentleman had seen on the screen had had validity for him. How much more does it have validity for the child!

This attitude of trustfulness toward what is seen on the screen is not much shaded until well into high-school years, if even then. Occasionally an entire and startling change in personality takes place in children and youth under the influence of a screen star who is admired. Such influences on conduct reach their maximum effectiveness in the disorganized areas of great cities peopled by the foreign-born and their children. Among such un-Americanized populations the movie is shown to be one of the major resources from which to become acquainted with what they conceive—often mistakenly; sometimes tragically—to be American ideals and ways. What the child sees on the screen he goes out and day-dreams about, imitates in his play, follows in his love-making, becomes a devoted worshipper of the screen stars who guide him into life.

(To be Continued)

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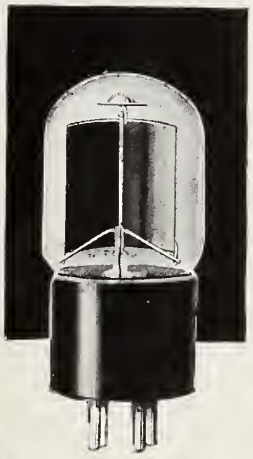

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